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ABSTRACT

Raising the environmental awareness of the population is a central element for developing a sustainable environment. This report is intended to highlight how schools, teachers, and students in Organisation for Economic Cooperation and Development (OECD) countries are attempting to meet the challenge of building a sustainable society through environmental education. The main pedagogical and research issues discussed in this report reflect intense work that was carried out in the participating countries at the grass-roots or school level. Chapter I addresses the challenges of international environmental education. Chapter II deals with the pedagogical, curricular, and teacher development questions that resulted from an analysis of national reports. Chapter III concentrates on action-research as it was implemented in the countries that used it as a tool in developing school initiatives. Policy issues are addressed in Chapter IV from an analysis of the outcomes of the five in-depth studies on environmental education policy that were carried out in Australia, Austria, Finland, Germany, and Norway. Chapter V concludes with some basic dilemmas concerning present developments in environmental education and makes recommendations for the future. Contains 57 references. (JRH)

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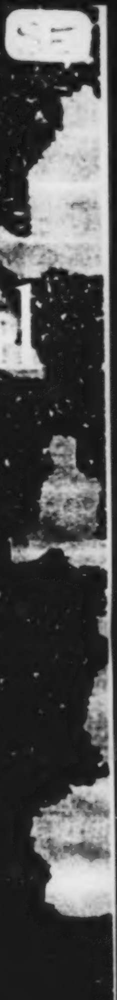

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Environmental Learning for the 21st Century

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

Pursuant to Article 1 of the Convention signed in Paris on 14th December 1960, and which came into force on 30th September 1961, the Organisation for Economic Co-operation and Development (OECD) shall promote policies designed:

— to achieve the highest sustainable economic growth and employment and a rising standard of living in Member countries, while maintaining financial stability, and thus to contribute to the development of the world economy;

— to contribute to sound economic expansion in Member as well as non-member countries in the process of economic development; and

— to contribute to the expansion of world trade on a multilateral, non-discriminatory basis in accordance with international obligations.

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Foreword

Raising the environmental awareness of the population is a central element for developing a sustainable environment. Some educators say that unless this is done between the ages of two and sixteen, it is too late. This report is about how schools, teachers, and students in OECD countries are attempting to meet the challenge of building a sustainable society through environmental education.

The Study on Environment and School Initiatives (ENSI) within the Centre for Educational Research and Innovation (CERI) was designed to promote the active engagement of teachers and their students in identifying, developing knowledge on, and acting to resolve local environmental problems. It draws upon the results of a wide variety of activities which took place between 1990 and 1994. Work done from 1986 to 1989 and the activities of the international network that had been constituted during that initial phase are reported in *Environment, Schools and Active Learning* (OECD, 1991).

The main pedagogical and research issues discussed in this report reflect intense work that was carried out in the participating countries at the grass-roots or school level. Eighteen national reports were submitted, based on evaluations of school initiatives. Chapter II deals with the pedagogical, curricular and teacher development questions that resulted from an analysis of these national reports. Chapter III concentrates on action-research as it was implemented in the countries that used it as a tool in developing school initiatives. Policy issues are addressed in Chapter IV from an analysis of the outcomes of the five in-depth studies on environmental education policy that were carried out in Australia, Austria, Finland, Germany and Norway. Chapter V concludes with some basic dilemmas concerning present developments in environmental education, and makes recommendations for the future.

Other activities and reports which have influenced the content of the present text include four scientific seminars organised in collaboration with Member countries, and two training seminars for national co-ordinators and pedagogical support persons. The first of these, on action-research methods, was organised in collaboration with the Italian authorities at the Centro Europeo dell'Educazione, Frascati, 4-9 June, 1990. This first meeting of the international network had two purposes: *i)* to familiarise participants with methods of action-research, and *ii)* to provide an opportunity to elaborate and reflect upon the research issues that were to underlie school initiatives. The main plans for the ENSI study were worked out at this meeting. The second training seminar, "Evaluating Environment and School Initiatives", was organised in Cromer, United Kingdom, in collaboration with the Centre for Applied Research in Education (CARE), University of East Anglia, Norwich. With the professional help of CARE staff, the members of the ENSI network reflected on and planned how they would carry out the evaluation of school initiatives in their countries. The results of this seminar have been published by the OECD.

The final conference of the ENSI study was hosted by the German Authorities in Braunschweig, 7-11 March, 1994. It contributed significantly to the elaboration of the present report, through the dialogue created between experts, teachers and high-level representatives on the future of environmental education.

This report was prepared by the Secretariat with the advice and contributions of several experts. Professor John Elliott from the University of East Anglia, Norwich, United Kingdom and Professor Peter Posch from the University of Klagenfurt, Austria, consultants to the study from the beginning, have contributed to the development of the analytical framework and respectively to Chapters II and III. Professor Ernest House from the University of Boulder, Colorado, United States, participated in the in-depth studies on environmental education policy and contributed to Chapter IV. Professor Michela Mayer, co-ordinator for Italy, contributed to the evaluation of school initiatives, as portrayed in Chapter II. The report would not have seen the light without the hard work and reflective contributions of the national co-ordinators, pedagogical support persons and teachers who have been involved in the ENSI Study.

The report is published on the responsibility of the Secretary-General of the OECD.

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Chapter 1

Environment and School Initiatives: The Challenges of International Environmental Education

Historical background and main issues

"Environment and School Initiatives" (ENSI) could be called an international attempt at curriculum development. Set within the Centre for Educational Research and Innovation (CERI) of the OECD, this study involved the participation of nineteen OECD Member countries. One of the key characteristics of the ENSI study has been its grass-roots, school-based focus: each participating country chose a network of schools practising environmental education with innovative strategies.

The history of the ENSI study dates back to the Conference of Ministers of Education in 1984, when Minister Herbert Moritz of Austria underlined that environmental education was one of the most important priorities for the future development of education. Austria then took the Minister's words to the CERI Governing Board in 1986 and proposed that a study be launched in this area.

Twelve Member countries took up the challenge of identifying and setting up innovative environmental education initiatives in schools. Each country created a network of approximately ten to twelve schools, and appointed a national co-ordinator to provide the links both within the country and with the OECD Secretariat. The objectives of the project were clearly defined from the beginning:

> "(...) Rather than trying to constitute an international shopping list of criteria for 'good' environmental education, the group of participating countries agreed to the challenge of defining a series of guiding principles that has no pretension of being 'value-free' (...) Given the growing 'environmental imperative' the following criteria were seen to constitute a 'new' responsibility for the education system – that is, the promotion of environmental awareness and of 'dynamic' qualities in students, such as initiative, independence, commitment, and readiness to accept responsibility (Kelley-Lainé, 1993, pp. 412-414)."

The link between environmental awareness and dynamic qualities provided the basic logistics for the choice of schools in participating countries. It was important to identify schools and teachers who were ready to take part in an innovative educational process, to analyse and document their work, and to practise flexible teaching and learning strategies. The following criteria for selecting schools were defined:

i) school initiatives were to include four dimensions:
  - personal involvement of students and their emotional commitment;
  - interdisciplinary learning and research;
  - reflective action to improve environmental conditions;
  - involvement of students, at least partially, in decision-making, or problem-finding, on procedures and on monitoring their work;

ii) the concept of environment was to be broadly defined, not limiting school initiatives to the natural environment but including social, economic, cultural and technological dimensions;

iii) the activities of the schools were to extend beyond the boundaries between schools and community to links with outside institutions; and

iv) different kinds of schools represented were to include primary, secondary and vocational schools.

The participating teachers were asked to interpret these criteria within their own national and local contexts, as well as to monitor their initiatives by reflecting on their activities with a view to continuous improvement. This type of strategy, a form of action-research, was to make a significant contribution to gaining knowledge of environmental project work.

The results of this initial two-year phase were discussed at an international conference and public project-exhibition in Linz, Austria, in September 1988, attended by 350 participants from twelve OECD Member countries. One hundred and fifty of the participants were students from 9 to 19 years of age, accompanied by 120 teachers; other participants were administrators from Ministries of Education and Environment, and experts and researchers in environmental education.

The conference was considered to be a rather unusual one for the OECD, given the significant "grassroots" participation that included students, and was found to be very successful in the way it favoured exchange among the different partners of the education system. As a result, the CERI Governing Board decided to continue the work, and a full-fledged project with the participation of 19 OECD Member countries was launched.

This second phase of ENSI was built on the results of the 1986-88 period, taking these further by:

i) Expanding the network of schools involved, and improving the national and international exchange of these experiences.

ii) Strengthening the support structures for environment and school initiatives by the appointment of pedagogical support persons to work directly with the teachers, as well as a national co-ordinator in each country. In many cases, pedagogical support persons are researchers based in a university and are familiar with action-research methods.

iii) Taking action-research further with teachers to strengthen their research activities, especially that of producing knowledge.

iv) Exploring, analysing and developing critical reflection on the interaction between grassroots environment and school initiatives and environmental education policy developments in OECD Member countries. Five of the participating countries requested that in-depth studies of environmental education policy developments be carried out. The Secretariat and teams of experts conducted these studies in Australia, Austria, Finland, Germany and Norway.

v) Examining the relevance of recent developments in the environmental sciences for environment and school initiatives. This was done through a number of organised encounters between specialists in the environmental sciences, and teachers, researchers and the ENSI network of national co-ordinators and pedagogical support persons.

The following issues were considered in four seminars:

- teaching for sustainable development (Enschede, the Netherlands, April 1990);
- images of nature, man and science in environmental education (Perugia, Italy, May 1992);
- economy and ecology (Sunder, Germany, September 1992); and
- values in environmental education (Stirling, Scotland, May 1993).

Dynamic curriculum, networking and professional development in environmental education

In Chapter II, both Elliott and Posch base their arguments on the need for a dynamic approach to educating future generations, given the sharpening world-wide awareness of the "environmental imperative". Just as the IUCN, UNEP and WWF 1990s action plan for the World Conservation Strategy argues that:

> "What is needed is a fundamental transformation of people's attitudes and practices (...) Only a new world view and morality can change the basic relation of people to the earth. People's behaviour is a matter of choice based upon values (...) The need for a world ethic of sustainability – an ethic that helps people co-operate with one another and nature for the survival and well-being of all individuals and the biosphere – could not be greater (Fien, 1993)."

Elliott and Posch call for the need for developing a student's "capacity for intelligent and responsible action" and for the development of dynamic networks that are "the autonomous and flexible establishment of relationships to assist responsible action in the face of complexity and uncertainty" (Chapter II, Section 3).

Throughout the national reports there is a call for a new "ecological ethic" or a new "environmental paradigm". It is evident that education, both in school and outside, is fundamental in any paradigm shift if it is indeed to take place. A number of Australian environmental educators distinguish education *for* the environment from education *about* and *through* the environment:

> "Education for the environment stands in contrast with education about and through the environment. Education for the environment seeks to engage students in the active resolution of environmental questions, issues and problems. This involves a wide range of knowledge, skills, values and participation objectives which are not addressed by teaching environmental facts and concepts (education *about* the environment) or by experiential learning in nature (education *through* the environment) (Fien, 1993)."

Elliott distinguishes between environmental education, environmental studies and environmentalism: "The latter (environmental studies) is cross-disciplinary but this does not necessarily involve an interdisciplinary mode of knowledge construction, which aims to inform intelligent action in the local environment." Environmentalism, according to Elliott, is students taking in ideas about the environment that are not based on their own experience of it – the risk here is one of identifying with a committed teacher's personal views. Therefore, students need to have "experience-based topics so that learning is not a matter of the children simply taking in the principles of environment-friendly behaviour without thinking; they need to discover the environment, study situations and carefully seek solutions" (Chapter II, Section 1).

The ENSI study, in suggesting four basic principles to guide the choice of school initiatives, attempted to set the work within this new paradigm wherein environmental education includes personal involvement and motivation to act, critical capacities to be able to identify and formulate problems, the opportunity to view environmental issues in their complexity, and – through interdisciplinary learning and research rather than simplifying causal relationships – the opportunity to have an impact on matters of real social concern that develop dynamic qualities in students, *i.e.* initiative, independence and responsibility.

Such aims have been a challenge to schools attempting to apply them in ENSI, by carrying out significant actions for the environment and constructing knowledge from concrete experience. The national reports describe some of these adventures and also show a few of the difficulties in integrating this new paradigm of teaching and learning within the mainstream curriculum in schools.

One significant issue confronting schools participating in the project has been the role of values and how to tackle controversial questions in schools. The Italian national report states:

> "The problem is one of comparing values. Although very often implicit inside schools, values come into the open in environmental education, be they the teacher's values, those of the social and family environment, or those that influence the solution to a problem which must be dealt with. And in a culture of complexity, values are an integral part of a problem. The teacher's role is very difficult in this situation (Losito and Mayer, 1993)."

The authors cite an Italian teacher's expression of achievement in relation to the problem:

> "One of the most important 'challenges' in environmental education is, in my view, that of educating for comparison of values, of different views on a problem. If

students learn to value the complexity of environmental themes, if they acquire a method for analysing the 'positions in the field', then they will really be free and able to choose their own position, both to understand and 'reveal unexpressed reasons' (political, economic, etc.) which lie behind the choice of position on the part of various subjects involved in the problem (Rodolfo Vezzosi, Cerreto Guidi Middle School)."

How to evaluate the quality of environmental education and the development of dynamic learning in students has also been a challenge for ENSI – that is, to evaluate the outcomes, not only of the actions taken but also of the processes that evolved. Action-research was used as a tool to favour reflection and formative evaluation. John Elliott, in his address to the Scottish seminar "Values in environmental education", stated: "Learning to act reflectively and intelligently in relation to the environment is not so much a process of acquiring information about the environment and then applying it in action, but rather a matter of learning to deliberate about the practical problems one experiences in relating to the environment (Elliott, 1993, p. 23)."

According to Elliott, the capacity to deliberate involves the development of four basic intellectual qualities:

- "cognitive initiative", or the capacity to initiate a course of action to improve a situation;
- the capacity to diagnose, discern and discriminate the practically relevant dimensions of the problem situation;
- the capacity to share the thoughts and feelings, the points of view, of those who are involved in the situation; and
- the capacity to reflexively self-monitor one's own actions and their consequences in the environment.

These could be called indicators of "dynamic qualities, powers of understanding, which can be equally displayed by individuals who adopt different value positions on environmental issues and arrive at different conclusions about what ought to be done" (*ibid.*).

Are teachers being trained to meet the multiple challenges of environmental education? The results of the five in-depth studies show that the training of teachers in environmental education is the weakest point in all countries. Often initial training is non-existent and in-service is too costly. In Chapter II (Section 3), Posch outlines the important potential of dynamic networks for professional development: "Dynamic networks appear to be an increasingly important framework for professional development. They permit the effective utilisation of know-how, abilities and energies that already exist in the teaching profession (for further education of teachers)."

However, this implies a new conception of educational support; the national reports illustrate how dynamic networks were used to foster professional development of teachers. One may even suppose that the ENSI network of national co-ordinators and pedagogical support persons has also functioned as a dynamic network.

Environmental education practice – a challenge for policy

The outcomes of the environment and school initiatives study have highlighted many aspects of international developments in environmental education in OECD Member countries:

- advanced innovative practice in schools;
- the effective use of networking as a tool in education and teacher training (Posch, Chapter II);
- the use of action-research as a method of formative, ongoing evaluation for teachers carrying out community-based school initiatives; and
- teachers, students and schools tackling controversial issues within their local environment (Perugia seminar).

However, if one would consider the need for a new "environmental education paradigm" throughout education systems, with wide political legitimacy, solid epistemological status, and the funding to back up research and teacher training – as in some mathematical and scientific areas – then present policy measures are not yet up to meeting that challenge.

The development of environmental education policies in OECD Member countries participating in the ENSI study are set within particular social and cultural contexts. Governments are moved by grassroots initiatives that are often conditioned by environmental accidents, threats or the fragility of the land. Environmental issues are high on the agenda if there is sufficient grassroots pressure. Institutions, universities and policy-makers do not seem to be initiating environmental policies or activities but are, rather, responding to the initiatives taken by schools, students, parents and other grassroots organisations (see House, Chapter IV).

Environmental education policies tend to be voluntary and permissive rather than mandatory. Although environmental education appears in the curriculum guidelines, it is often considered with other "soft" issues such as gender studies, native populations, or man and society. In some systems, environmental education is still in its traditional place of "nature conservation".

In order for a new "environmental education paradigm" to develop, there is the need for the creation of a fresh knowledge base that can master the complexity of the interdisciplinary nature of environmental issues. For this to occur there needs to be a significant investment on the part of universities, both in research and in the professional development of teachers. Governments need to invest funds to stimulate these activities at higher education levels as well as in other institutions.

Part of the question of "legitimacy" is related to the fact that environmental education is seen as competing with economic development. It is both necessary and urgent to consider that economics is a very important part of environmental education, as are issues concerning values and investment of human resources (see *Environmental Education in Germany*, 1992). Some industries are in fact realising the importance of creating partnerships with schools in this area, for they are conscious of the need to train future workers and managers in environmental issues.

Chapter II

Teaching and Learning in the Environment

Reconstructing the Environmental Education Curriculum: Teachers' Perspectives

by

John Elliott

"(...) Not subject and object but static and dynamic is the basic division of reality. When A.N. Whitehead wrote that 'mankind is driven forward by dim apprehensions of things too obscure for its existing language', he was writing about Dynamic Quality. Dynamic Quality is the pre-intellectual cutting edge of reality, the source of all things, completely simple and always new (...)" (Robert Pirsig, *LILA: An Inquiry into Morals*, 1991, Chapters 8-9).

ENSI as a framework for constructing novel conceptions of environmental education

ENSI invited schools to initiate environmental education programmes within a framework of aims and principles, and to use action-research as a means of examining and resolving the problems of realising them in practice. The aims cited the development of dynamic rather than passive qualities in students, and the use of interdisciplinary inquiry to foster environmental awareness. The principles emphasized students experiencing their environment as a sphere of personal influence, examining it as a subject for interdisciplinary learning, being given opportunities to shape it in socially significant ways, and accepting it as a challenge for initiative, independence, and responsible action. Beneath this framework lays a theory of knowledge which differs from that which has traditionally underpinned the construction of school knowledge. It consists of a cluster of ideas developed by Pierce, James and Dewey under the label of pragmatism. These include the views that:

- "knowledge is derived from experience, experimental methods, and practical efforts;
- knowledge must be used to solve the problems of everyday practical affairs to help us adapt to our environment. Thinking must relate to practice and action;
- ideas are guides to positive action and to the creative reconstruction of experience in confronting and adjusting to new experiences;
- truth is that which has practical value in our experience of life. It serves as an instrument (...) in our ability to predict and arrange the future for our use;
- truth is changing, tentative and asymptotic; and
- the meaning of an idea (theory, concept, belief) is the same as (...) the practical use to which the idea may be put (...)" [Peter A. Angeles (ed.), *The Harper Collins Dictionary of Philosophy*, second edition].

This dynamic theory of knowledge, action-oriented and situated in the experiences of everyday living, stands in marked contrast to the static theory of knowledge proclaimed by the Greek philosophers and enshrined in the European tradition of education. In reflecting about why the Greek philosophers came up with "the idea of a higher realm of fixed reality of which alone true science is possible, and of an inferior world of changing things with which experience and practical matters are concerned", John Dewey (1960) argued that they "glorified the invariant at the expense of change, it being evident that all practical activity falls within the realm of change". In doing so, "they bequeathed the notion (...) that the office of knowledge is to uncover the antecedently real, rather than, as is the case with our practical judgements, to gain the kind of understanding which is necessary to deal with problems as they arise". According to a pragmatic theory of knowledge, the function of "reflective thought" is not that "of copying the objects of the environment" in terms of their invariant characteristics or essences, "but rather of taking account of the ways in which more effective and more profitable relations with these objects may be established in the future" (McDermott, 1977).

If a pragmatic theory of knowledge underpins the curricular aims and principles of ENSI, then the project's advocacy of action-research as an approach to both student and teacher learning is entirely consistent with it. Action-research simply involves what Dewey called the "transfer of experimental method from the technical field of physical experience to the wider field of human life". In this latter context, human action is viewed as an experiment to be modified and adjusted in the light of data about its consequences and effects. In advocating the transfer of experimental method to everyday experience, Dewey did not deny the value of the prejudices which shape so many of our actions in everyday living and which are derived from social customs, traditions and institutions. He accepted the Aristotelian definition of "experience" as practical competence acquired by repeatedly doing something in a given situation according to certain customary precepts or rules. In this sense, experience implies a conservative stance, since future action is governed by patterns of conduct established in the past. Such a stance is necessary to avoid chaos in our lives. But Dewey argued that "experience" shaped by custom and tradition is not always sufficient to accommodate the future. New conditions are introduced into the practical situations of everyday living, which cause our experience to be problematic and challenge us to reflectively reconstruct it, by experimenting with our behaviour to render its effects less problematic. In a world of rapid social change, the fund of practical knowledge and skill embedded in our "experience" has to be continuously updated by integrating the experimental method as an approach to everyday living.

The experimental method, from a pragmatic point of view, does not introduce any radical discontinuity in the experience of everyday living. The prejudices derived from custom are not totally jettisoned and replaced by an entirely new perspective. Rather, it enables "experience" to be modified by incorporating new understandings which accommodate the changing conditions of social work. Intelligently responding to change does not deny preserving a degree of continuity with past experience as some "progressive" educators have implied. In doing so, they have distorted the pragmatic understanding of experience articulated by Dewey.

> "It is not for a moment suggested that we can get away from customs and established institutions. A mere break would doubtless simply result in chaos. But there is no danger in such a break. Mankind is too innately conservative (...). What there is genuine danger of is that the force of new conditions will produce disruption externally and mechanically (...). The prospect is increased, not mitigated, by the conservatism which insists upon the adequacy of old standards to meet new conditions. What is needed is intelligent examination of the consequences that are actually effected by inherited institutions and customs, in order that there may be intelligent consideration of the ways in which they are to be intentionally modified on behalf of generation of different consequences. This is the significant meaning of transfer of experimental method from the technical field of physical experience to the wider field of human life (Dewey, 1960, pp. 3-25)."

It is in this light that we should view the advocacy of action-research in ENSI, as a means of developing both environmental awareness and the professional knowledge of teachers. The rapidity of change in the condition of our natural and built environment renders some customary patterns of human conduct problematic. Traditional attitudes need to be re-examined in the light of their effects and, if necessary, reconstructed through social experiment. Action-research is not the only approach to changing environmental attitudes. It is simply the course entailed by the pragmatic theory of knowledge which underpins the curricular framework of the ENSI project. And inasmuch as this theory differs from the assumptions which shape curricular and pedagogical practices in schools, the framework it underpins will, according to its own inherent logic, only be operationalised under conditions which enable teachers to use it as a basis for a curriculum experiment, in which prevailing curricular assumptions are criticised and modified, and curricular practices are reconstructed.

The 18 national reports provide ample evidence that, in countries where they were helped to adopt an action-research approach, teachers were able to use the ENSI framework as a basis for reconstructing their curricular practices. Such evidence is provided by the emergence in some of reports of conceptual distinctions, which forge new directions for environmental education and its place in the school curriculum.

Environmental education as an education for complexity

Six months prior to the scientific seminar in Perugia, teachers in the Swedish network, in preparation for their fourth meeting in November 1992, had begun systematically to collect data on teaching and learning processes, which included interviewing students about their perceptions of the extent to which they were able to direct their own learning. At the Swedish ENSI meeting teachers shared their findings.

> "The most important outcome of this meeting was that the teachers, and not someone from 'above' found out about there being no real influence of students on the classrooms (Axelsson, 1993, p. 32)."

They arrived at a "common agreement" that without influence there is no space for dynamic qualities to develop, and they decided to focus their future efforts on enabling students to have greater influence over their learning processes.

The Perugia seminar appears to have helped the Swedish network discover a solution to the problem of "low student influence" by enabling them to redefine as an essentially curriculum problem, what they had assumed to be a problem of pedagogical method. The ideas discussed at the Perugia seminar on "complexity" enabled them to link the problem of "the small degree of influence from students" to a new understanding of environmental education.

In particular, Michela Mayer's argument that the environment "is not a repertoire of elements allowing one to finalise and enrich the disciplines, but it is our field of action, our test for a complex approach to reality" (Mayer, 1992) influenced the Swedish delegates. The argument rests on the view that the complexity of relationships between human actions and the environment cannot be grasped in terms of the "objective" representations of phenomena provided by particular scientific disciplines, because these representations or images are continuously shaped and reshaped by human judgements of what is significant for human action in particular historic and social conditions (see Cini's Perugia address in Mayer, 1992). While not excluding a consideration of the representations (concepts/images) derived from the scientific disciplines, Mayer argues that educating for complexity in environmental education involves going beyond them to reflect on and compare the different values and points of view which underpin them. Complexity "re-introduces individual values into the 'scientific' knowledge process together with the subject" and therefore the idea of the environment as the sphere of purposive human action and responsible choice.

> "Consequently, educating towards complexity means action, a project, active involvement in the research field – in our case, the environment (Mayer, 1992)."

Environmental education as a process of developing capacities for intelligent action rather than one of transmitting discrete elements of knowledge dissociated from the practical purposes and values which underpinned their construction

The Swedish delegates in Perugia began to link ideas about education for complexity to their action-research problem of "student influence", in a way which illuminated it as a curriculum problem rather than a technical problem of teaching methods. The problem partly lays in teachers' reductionist views of the subject matter as knowledge elements which are detached from the purposes and value judgements that shape human experience of the environment. Once the subject matter is redefined as a complex sphere of personal influence in which knowledge is constructed to inform purposive human action, then space is created for students to construct their own knowledge by reflecting on aspects of the environment which they judge to be important and significant for their lives. In other words, redefining the subject matter in the terms suggested at Perugia enabled the Swedish teachers to conceptualise a solution to the pedagogical problem of "low student influence", which they had identified in their classrooms. But they discovered that simply involving students in environmental action projects which they, teachers, believed desirable, did not solve the problem. Interviews with students suggested a linkage between "low student influence" and student perceptions of the value of environmental action in their lives. The teachers concluded:

> "Within the same concept is the idea that students do not put any effort into their schoolwork unless they find it 'important'. And environmental issues are obviously not important to Swedish students (Axelsson, 1993, p. 57)."

This pessimistic discovery, however, prompted them to inquire into their students' perceptions of what they valued in their environment, and to plan environmental education programmes around these aspects of experience. The journey of discovery for the teachers is well illustrated by the following account of curriculum planning in one school:

> "To promote environmental awareness the teachers started with grand ideas, wanting to transmit these to their students. The teachers wanted the students to take action against plans to transform an area of biological diversity into a golf course. They also wanted the students to commit themselves to a life of less consumption and more congruent with sustainable development. Through observations and interviews of their students the teachers have grown aware of the fact that their students did not respond to the opinions of their teachers to a degree that the teachers had expected. Students would agree to do what was asked of them as their teachers were OK, but they did not in any way want to commit themselves (...). From the findings of this research, the teachers are replanning their environmental projects for the next group of students that they will receive in the autumn of 1993 (*ibid.*, p. 37)."

The Swedish national report (*ibid.*, p. 15) claims that ENSI teachers have made a unique contribution to discussions about environmental education by combining three characteristics:

- attempts to describe patterns of classroom organisation;
- observing and reflecting about classroom events using action-research methods; and
- using ideas about complexity in environmental education discussed at the Perugia conference.

These characteristics created:

"A connection between a general discussion about classroom organisation and a discussion about environmental education, whereas discussion about environmental education before the ENSI project mostly confined itself to issues of content and methods (*ibid.*, p. 17)."

They also generated a discovery that is reflected in a number of other national reports – namely, that involving students in action projects which reflect other people's environmental values and beliefs does not develop their environmental understanding in a form which enhances their capacity for intelligent and responsible action in the environment. The transition of a project-based pedagogy for environmental education is not complete until the students are able to make the projects their own.

Of all the national reports, the Danish report (Christensen, 1993) provides the most detailed accounts of the pedagogical problems teachers experienced in this transition. It contains two splendid teachers' case studies in Vigersted and Skaelskor schools of action-research using observations, diaries and interviews with pupils, aimed at the development of project work in environmental education. At Vigersted the teachers attempted to involve their pupils in topic planning and believed they had negotiated a project on local methods of animal husbandry. However, they were well into the project before they discovered that a considerable misunderstanding had arisen at the negotiation phase. And it was only exposed when they were given access to an interview the ENSI national co-ordinator held with the pupils. It:

> "(...) showed that teachers and pupils had completely misunderstood each other when planning the theme. We had agreed to work with domestic animals but we had obviously different concepts of domestic animals. We had meant production animals and the pupils had meant pet animals (...). They preferred to work with domestic animals, and therefore, they were surprised when we introduced the work on farm animals: 'those (the hens and pigs) are rather strange domestic animals, because they do not live in your home'. That applied particularly to the girls while the boys had thought that it was to be something about pollution. None of the pupils had thus wanted to work with what we had brought, even though we had said that they should help to decide. It was no wonder that the atmosphere was a bit listless. It is remarkable that the pupils did not protest (...). Maybe they were too respectful to argue against us" (Christensen, pp. 23-24).

The problem of the teacher's traditional authority position alluded to here will be returned to in greater depth later, but it is worth noting that the "respectfulness" hypothesised hardly masked a measure of apathy on the part of pupils. Yet in spite of this, "pupils had opinions on the conditions and saw the conflict (...)". What was missing was any motivation to take action: "(...) They all accepted the way things were" because they felt the situations were beyond their power to control.

> "Some accepted that economy controls the animals' living conditions, while others realised that they could not change the economic control and therefore must accept its influence on the animals' conditions. Therefore, at no point did it seem natural for the pupils to act (*ibid.*, p. 29)."

But when the teachers temporarily changed the project to one which focused on pupils' pets, they encountered another problem. Pupils resisted making any changes in their customary treatment of their pets. In school they did not think about their own practice or come up with any "problem formulations":

> "Perhaps because 'everyday awareness' protects against realities: in daily life it is too straining to face all the problems and therefore a special awareness is created, in which a lot of problems are omitted (...). All the children get a private need satisfied by having close contact with an animal. When the golden hamsters for example ran stressfully around the cage, the pupils defended it by saying they got exercise and amused themselves. The border between the public and private sphere was not crossed and we did not force it (*ibid.*, pp. 28-29)."

The public sphere is that of school work, and the private sphere involves informal activities at home and in the locality. The pupils resisted critical reflection on their private experiences within the public sphere of schooling. The Vigersted case study demonstrates the difficulty teachers face in developing a pedagogy to develop students' capacities for intelligent action in the environment. It shows why action-research is no "optional extra" for teachers committed to the ideas embedded in the aims and principles of ENSI.

Environmental education is different from environmental studies

The Scottish national report (McAndrew and Pascoe, 1993) describes and evaluates the impact of the ENSI project in a national context, where environmental studies is an established feature of the mainstream curriculum. Its major characteristics include the study of cross-disciplinary themes such as transport, local studies and fieldwork. Yet the report shows how teachers in ENSI schools used the project's framework to reflectively develop their practice in a new direction. Retrospectively it claims that the established practice had resulted "in a degree of confusion and misunderstanding with teachers when discussing environmental education". The experience of action-research using the ENSI approach has enabled teachers to clarify a distinction between environmental education and environmental studies. The latter is cross-disciplinary but this does not necessarily involve an interdisciplinary mode of knowledge construction, which aims to inform intelligent action in the local environment. It uses fieldwork methods in the context of local studies, not to construct usable knowledge in the local community but to develop more abstract, less situation-specific, knowledge and generic-information processing skills.

The Scottish report describes examples of environmental studies projects which illustrate typical objectives of this kind of curriculum:

- *the acquisition of knowledge with understanding gained in the field*, to use later in the classroom for analysis and comparison with other available second-hand sources of information. What evidence is there of changes in shopping patterns in the last generation?
- *the first-hand application of a number of process skills* which may have been introduced earlier as class lessons, *e.g.* the use of questionnaires, sampling, recording and field-sketching techniques (*ibid.*, p. 49).

The ENSI framework prompted teachers into an "exploration of values and attitudes in pupils" and "a consideration of the place of participatory action and involvement" (*ibid.*, p. 50). It enabled teachers to incorporate two new dimensions into their practice and thereby to reconstruct their understanding of the environmental education process along similar lines to the Swedish teachers; an understanding which acknowledges the force of Mayer's point (above) that the environment is not so much a repertoire of elements for enriching the disciplines but a complex sphere of human action. It is also an understanding which implies a new role for schools in their communities as constructors of local knowledge with and for the community.

Sweden: "The school has managed what so many schools envy them for: it has become the centre in a small village (...). The school is the place where knowledge is to be found" (Axelsson, 1993, p. 43).

Scotland: "The ENSI principle of 'encouraging community-focused actions developing local knowledge construction' provided more than just a meaningful or persuasive context for the other principles espoused, *i.e.* fostering environmental awareness and developing dynamic qualities in pupils; encouraging action-research in teachers; and seeking and securing networking opportunities and partnerships beyond the confines of the classroom. It was the connective tissue which gave clear purpose and coherence to planning, implementing and evaluating actions" (McAndrew and Pascoe, 1993, p. 43).

Thus, action-orientated inquiry by pupils in their locality requires them to network with a variety of people and agencies in their community, and results in them "being exposed to and learning something of a range of views on specific issues and how these are arrived at" (*ibid.*, p. 45), which in turn enables them to reflect about the values which shape their own conduct and to share their learning with others "in an open way and in informal settings".

Environmental education *vs* promoting environmentalism

The Swiss national report (Kyburz-Graber *et al.*, 1993) admirably documents in some detail the reflections of ENSI teachers about the problems of project-based curriculum planning.

> "Multiple fears and prejudices among teachers, parents, and authorities are at the origin of resistance to environmental education. The milieu determines the teachers' commitment to local environmental education (*ibid.*, p. 46)."

The report highlights the expectations of professional colleagues, parents and local authorities as a major source of resistance to any move away from curricula aimed at the transmission of knowledge organised in subject categories. It suggests that these cannot be changed until teachers develop greater expertise in assessing pupils' intellectual and personal development through project-based learning.

> "This teaching can rarely be compared with knowledge dredged out of books. The dynamic qualities acquired are not so easy to measure as knowledge tested by someone. The unaccustomed experiences in learning put a teacher in a position where he has a great need to justify himself *vis-à-vis* colleagues (*ibid.*)."

The Swiss teachers also suggest that resistance to environmental action projects from colleagues, parents and authorities comes from their anxieties about the use of such projects as a vehicle of indoctrination:

> "What is more, the prejudices qualifying environmental education as dogmatic may cast a shadow over the debate on the fundamental pedagogic importance of environmental education (...). The authorities fear that environmental education activities, of a political nature, give the school a bad reputation. They prefer a more discreet school, sticking to the rules, which guarantees the acquisition of essential knowledge and does not lead to critical behaviour. They do not wish to get themselves a 'green' image because this is a source of prejudice and is often put in the same pigeon-hole as extremism (*ibid.*, p. 46). Reactions of rejection or lack of interest, often seen in colleagues, indicate that environmental education is often perceived as an attempt at the 'green' indoctrination of the children. Even teachers who embarked on environmental education very early are beginning to doubt (...). There is also the case of a once very committed teacher who refused to collaborate in the OECD project, saying that he no longer wanted to abuse and manipulate the children in order to resolve environmental problems, this not being their responsibility. These reservations show that environmental education is understood as being focused on a direct change of behaviour and of the state of the environment and that the children are, so to say, used as tools to achieve these ends. This perception of environmental education was on many occasions the subject of discussion during the Swiss OECD seminar (*ibid.*, p. 45)."

In spite of these perceptions of environmental education, the Swiss teachers involved in ENSI persisted through collaborative action-research, which "permitted the exchange of experiences and ideas" and resulted in them "analysing and discussing environmental education questions together", to develop an idea of project-based environmental education which did not promote some dogmatic version of environmentalism, and therefore did not depend on teachers who were committed to such dogma. The idea of environmental education that emerged was not dissimilar to the one arrived at by the Swedish teachers.

> "The pupils have no need for a didactic motivation phase for teaching concerned with the environment. When the work draws on the pupils' own experiences and they can formulate their questions, then interest and ideas grow with the joint learning of the participants (...). It is more important for the teachers to propose a learning situation in which the children have enough freedom to develop their own interest in the topic. This requires calm and patience over a long period (...). The question of motivation does not arise in the same terms as in traditional teaching. The fear often expressed by the teachers that the children would be rapidly saturated by this topic was not confirmed, no doubt because: the teaching does not concern the global environment which, in association with disaster scenario reports in the media, may give rise to fears, but is concerned with the local environment. This is no longer abstractly called 'the environment', but rather 'my school path', 'our hedge', 'our pond', 'what I eat', 'waste in our school', 'waste in our hospital', 'let's observe the weather', 'my nature corner', 'my commune', 'everyday noise', and so forth (Axelsson, 1993, Sec. 4.7)."

And within these personalised experience-based topics learning is "not a matter of the children simply taking in the principles of environment-friendly behaviour without thinking; they need to discover the environment, study situations and carefully seek solutions". Such are the criteria for a learning process which develops students' capacities for authentic and intelligent action (*ibid.*, Sec. 4.8). But what are the implications for the teacher's role of this student-centred view of environmental education?

Environmental education as an interdisciplinary inquiry rather than cross-disciplinary studies

The Italian national report (Losito and Mayer, 1993) depicts a distinction between "environmental education" and "promoting environmentalism" emerging from the action-research of teachers in Italian ENSI schools. The teachers in this country have been exploring the ENSI framework as an interpretation of what it means to educate for the complexity of phenomena and relations in the environment. Without denying the value of specific disciplines of knowledge, they came to recognise their limits in developing environmental awareness. If used, like magnifying glasses, to grasp "the nuances of complexity", they are useful and important in environmental education, but "understanding" or "awareness" cannot be reduced to the sum total of specific disciplinary knowledge. Interdisciplinarity is not simply learning about the environment through and across a range of disciplines. It involves this but at the same time transcends it, as the following comment from students in an Italian school illustrates:

> "We expected to apply notions of chemistry and other school subjects, but this was not the case (...). We had to use new criteria, we could not have described the environment using school subjects, but (...) through new knowledge that does not apply to any one particular subject but at the same time connects all of them (*ibid.*, p. 71)."

Disciplinary knowledge cannot simply be applied to solving the problems of action in the environment, because it rests on partial points of view which are shaped by particular human purposes and values operating in specific historical and social contexts. In other words, its construction is conditioned by the practical problems which arise from culturally and historically shaped human experience in the environment. The Italian report argues that:

> "Real and concrete problems are predisciplinary. Putting them at the centre of environmental education work involves a different relationship with disciplines (*ibid.*, p. 80)."

The disciplines on this view become "instruments of in-depth analysis of different possible 'maps'" of problems which arise from students' experiences of the environment as a sphere of human action, and "should not be confused with the actual territory" (*ibid.*). The report goes on to ask the curriculum questions:

> "Is it the discipline that determines its own conceptual structure and hence the 'order' with which this structure is presented in schools, or do problems direct and change the presentation of disciplines? Is it environmental education that integrates

school curricula or are curricula-oriented by the environmental problem to which they are applied? (*ibid.*)"

If the answer to both questions is the former, then curriculum development and pedagogy are not distinct activities, since the curriculum is constructed in the pedagogy of project-based environmental education. But it still leaves the teacher in the role of representing the disciplines, albeit in a different form. Educating for environmental complexity involves a recognition of the diversity of value positions which shape human conduct in the environment and give rise to controversial issues. It is essentially a process of enabling students to reflect about their own conduct and its effects on the environment by looking at it from other people's as well as their own value position. The Italian report claims that "All the projects and reports show moments of 'comparison with other views', inside and outside the classroom" (p. 75). Such encounters and discussions enabled "students to realise how 'data' appears different when values change" (*ibid.*). In other words, when environmental education is viewed as a process of looking at problems from different points of view, students come to realise how people's values enter into the selection and interpretation of the facts of the situation. In this context, disciplinary knowledge constitutes a resource for analysing environmental issues from particular points of view. The teacher's role is to represent the disciplines as methods students can employ to analyse what one Italian teacher calls "the positions in the field". He writes:

> "I think that a great achievement in environmental education is of not carrying out environmentalism. Any action aimed at creating respectful attitudes towards the environment would be very limiting if not counterproductive. One of the most important 'challenges' in environmental education is, in my view, that of educating for comparison of values of different views on a problem. If students learn to value the complexity of environmental themes, if they acquire a method for analysing the 'positions in the field', then they will really be free and able to choose their own position, both to understand and 'reveal unexpressed reasons' (political, economic, etc.) which lie behind the choice of position on the part of various subjects involved in the problem (*ibid.*, p. 76)."

The idea of educating for complexity in environmental education implied for the Italian teachers who subscribed to it:

i) respecting diverse value positions;
ii) refraining from promoting environmentalist values; and
iii) using interdisciplinary methods for analysing a range of positions.

Environmental education as developing an understanding of socially controversial issues

However, the Italian report reflects a great deal of uncertainty on the part of ENSI teachers concerning how they handled their own value positions in the context of respecting diverse positions and using the disciplines as tools for analysing them.

> "We tried to understand the pupils' values and not to transmit our own (...). We tried together to find ways of making them explicit and to accept those of others even if they conflicted with our own. With the pupils we realised the enormous difficulty in trying to bring all this about. Is this education towards values? We were very lucky, our values nearly always coincided with theirs! (*ibid.*, p. 75)."

But one would like to ask, "How do you know the values coincided, that such coincidence was not simply a matter of appearance?" The Vigersted School case study in the Danish national report (p. 15) illustrated the extent to which teachers underestimate the power of their authority position in the classroom. In the Skaelskor School case study within the same report, the teachers continue the "authority" theme in their analysis of project work with a grade 9 class. They aimed to overcome what they interpreted to be students' feelings of powerlessness in the face of environmental problems by requiring them to "carry out an action" through a project which focused on "easy-to-grasp, near and specific problems" (*ibid.*, p. 39). But at the same time, they were aware from previous experience of the way in which students resist taking responsibility by maintaining their teachers in the role of the traditional authority figure:

> "Throughout their time at school, most pupils have experienced that problems formulated by the teachers can also be solved by the teachers. We wanted therefore to try to be attentive to whether the pupils' non-formulation of problems concealed a desire that we should take on their responsibility (*ibid.*, p. 39)."

A close reading of the Skaelskor School case study suggests that the teachers did not rest content with the assumption that they could express their views in the classroom in a way which did not impose constraints on the freedom of their students to express their views. They appear to have moved towards a strategy for handling controversial issues, which was tested by British teachers 25 years ago in the context of Lawrence Stenhouse's Humanities Project (see Stenhouse, 1975); namely, that of procedural neutrality. The Skaelskor teachers write:

> "After a period where we mainly thought that the pupils should obtain the information themselves, we changed our attitude and told them immediately what we knew about the topics, but principally encyclopaedic information. Our own attitudes and the opposing attitudes were also expressed to a certain extent. We tried to give them the information that was important for their reflections (Christensen, 1993, p. 44)."

Although the teachers admit expressing their views, they appear to have toned them down for the sake of providing information in terms of its relevance to the problems identified by students, rather than offer their own point of view. They concluded that success in environmental education depends on students developing a strong sense of personal identity, which enables them to bridge the traditionally defined public sphere of schooling and the private sphere of individual values, and face the complexity of environmental problems. It is difficult for students to bridge these spheres when teachers continue to provide them with refuge against risking uncertainty by intentionally or unintentionally allowing students to use their authority position as an escape from responsibility for their own judgements and decisions.

> "Through the years, the school has taught the pupils that teaching is done within a certain framework. Physically it is limited to the school buildings, and there is a

fixed syllabus. After eight years, this everyday awareness about what is done is a fixed pattern for the pupils (and the teachers). This limiting awareness is not always an uncomfortable strait jacket, but is often a safe framework in which to seek refuge when something new and unknown threatens (*ibid.*, p. 51)."

ENSI invites teachers to break the fixed pattern of traditional schooling. And one of its central elements is the teacher's role as *an authority* on curriculum content, which in the context of ENSI has to be transformed into the teacher *in authority* over the process of handling that content in an educationally worthwhile manner.

It is interesting to note that the distinction between environmental education and the promotion of environmentalism in schools emerges from teachers' reflections on their authority position in some countries (Australia, Switzerland, Sweden, Denmark, Italy) rather than others. In a few countries ENSI seems to have made relatively little impact on environmental curricula that appear to be best characterised as "cross" rather than "inter" disciplinary environmental studies or science. In others, ENSI seems to have fostered an action project which has reflected the environmentalist values of charismatic teachers rather than values autonomously developed by students on the basis of self-reflection.

ENSI has been particularly successful in Austrian schools, and teachers have used action-research methods to develop their curriculum initiatives within the project's framework of aims and principles. But some of the projects reported appear to have been heavily influenced, both in their conception and execution, by a charismatic teacher. This is not to deny the evidence provided by the Austrian report of students' commitment and enthusiasm for their projects, which was both genuine and authentic. What was missing was evidence of a pedagogical process which fostered a reflective criticism of the values and beliefs which underpinned the action and research conducted. This may be explained in terms of two factors.

Firstly, as the Danish case studies revealed, some students during the course of their personal development want black and white answers to problems. They resist acknowledging the complexity of environmental problems and the plurality of value positions which shape people's responses to them. Such students seek a fixed and certain moral basis for their actions and they are impatient in their search for opportunities to enact them.

> "The choice of actions proved to be a problem. It was as if the pupils experienced the possibilities as all or nothing, understood as an aggressive: 'The problems must be solved now or', a disheartened: 'Nothing can be done'. It was really surprising that none of the pupils used the creative skills they had shown in other contexts (*ibid.*, p. 47)."

The Danish teachers working in a tradition of treating relations between human beings and their natural environment as complex and problematic (*ibid.*, p. 37) were reluctant to concede to the students' "need" for clear-cut solutions. It could be argued that some of the charismatic pedagogy evidenced in the Austrian report greatly appealed to this "need".

In their review of ENSI in Austria (House, Eide and Kelley-Lainé, 1993; see examiners' reports at the end of this volume), the authors report a *Burgermeister*'s view of student action projects in his town:

> "Have the students become too identified with a political party? No, there is an ideology, he says, but not one associated with one party. Students believe they are always right. If you give them too much freedom, they will never be satisfied. They would sit in the city council and make decisions if allowed. Who wants a city council staffed by 16-year-olds? Also, there is a danger that some teachers will exploit students for their own purposes. The city should go along with students when they are right, but both sides need to compromise (*ibid.*, pp. 53-54)."

Here there appears to be a recognition of the problem that the charismatic promotion of environmentalism in schools presents for local communities. And there is a tacit appeal for greater acknowledgement of the complexity of environmental decision-making in a democracy and for more dialogue and willingness to accommodate the perspectives of others. In other words, for a concept of action-oriented environmental education which transcends the straightforward promotion of an environmentalist ideology.

However, in spite of his reservations, the *Burgermeister* held a generally positive view of the projects which House, Eide and Kelley attribute to a considerable grassroots tolerance of environmentalism in Austrian society:

> "We were surprised at the endorsement of activist environmental projects by everyone from the Minister for Education to local government officials (Thonhauser *et al.*, 1993, p. 9)."

Such cultural tolerance evidenced in the Austrian report suggests a second factor which could explain why the report cites little evidence of student reflection about the value positions they adopted in their action projects. This does not mean that teachers and students encountered no conflicts with authorities and citizens in their local communities as the following extract makes clear:

> "A group of eight pupils and one biology teacher of the Real gymnasium in Imst defined themselves as concerned parties, when 'their' park (waiting area for school buses) was to be developed without their participation, following a decision from those 'at the top'. They opposed this decision and developed an alternative plan in painstaking work and supported by some well-meaning experts; this plan provided for 'essentially more green areas, a hilly landscape, wider pavements, lawn bricks and traffic rules with more consideration of pedestrians in adjacent streets (*ibid.*)."

In leaflets and in a letter to the editor in newspapers, the pupils informed the population. And – although not without resistance – they have ultimately asserted themselves. Now Imst has a new Bubkreuzpark corresponding to the ideas of the pupils, which meanwhile also meets with the approval of a large part of the adult population (Mair *et al.*, 1992, p. 2). A comment made by a colleague and included in the project diary clearly illustrates how narrow the bridge was on which the teacher involved moved in this project: "Thank goodness that you have no telephone. I do not think you could have borne the attacks of enraged citizens. Now the protest is gradually abating. In the end, most of them will like it".

Conflict appears to have been resolved, not through discussion between the conflicting parties and mutual accommodation, but by winning the battle in a cultural context where tolerance ultimately prevails.

The in-depth review discovered some teachers who felt that community action projects of the kind described do not necessarily lead to a permanent change in attitudes and values. They refer to a teacher in an ENSI school who claimed that effects were long-term and difficult to judge: "Students do not switch off the lights in the school any more than they did before the energy project".

It is this factor of cultural tolerance which perhaps also explains why teachers in Austria appear to express less concern than in some other countries about the impact of their authority position on the way students come to adopt values, and on the relationship between the promotion of environmentalism and environmental education.

In countries where there is less grassroots tolerance of environmentalism, schools and teachers are faced with two alternatives. Schools either respond by playing it safe and adapting environmental education to existing curricular patterns (as in environmental studies), or break those patterns by developing an imaginative conception of environmental education which enhances students' capacities for intelligent action in a pluralistic society, while protecting an impartial role for the teacher in handling controversial issues.

A cultural tolerance for the promotion of environmentalism also appeared to be high in Finland. The detailed descriptions of action-research projects carried out by students appear to have involved little conflict with the local communities of the schools involved. Once a problem was identified from the data gathered by the students, and their findings communicated in the locality, there appeared to be little conflict aroused by the solutions proposed. However, the report is rightly tentative about this, given the limited data available to the national co-ordinator. He writes:

> "Most efforts have been concentrated on the collection of general descriptions of the work done. There has been a lack of deeper understanding of the process (Kurtakko *et al.*, 1993, p. 49)."

He suggests that:

> "The question of on what issues and to what extent an individual school should be allowed to take a public stand and try to influence decision-making might present a problem. Within the national project, influencing has been conceived very broadly. In all activities of the schools, the aim has been that the learning process leads to a positive end result, a solution to a problem (...). The national project has put no strict limits on how schools have wished to influence their near environment. However, no school has been given the right to disregard the general rules and regulations. The schools have been informed that they must observe local and national values and objectives. Teachers have followed the principle of 'dignity', and have well been able to decide by themselves what kind of influence has been possible (*ibid.*, p. 47)."

It could be that teachers in the schools simply decided not to allow students to embark on projects in areas they believed to be actually or potentially controversial in the locality.

In areas of potential conflict of view the evidence in national reports as a whole suggests that:

i) teachers need to research the impact of their authority position on the values promoted through students' projects with a view to developing strategies for handling socially controversial environmental issues, in a manner which promotes an understanding of different points of view;

ii) such research is threatening, stressful, and therefore difficult for teachers to accomplish without a considerable amount of pedagogical support from outsiders and professional colleagues; and

iii) its outcomes (strategies) need to be endorsed by the school authorities, and capable of justification in the local community.

With respect to ENSI in Finland the report, with admirable frankness, states:

> "Research has not always been in step with the project, nor has it always given the schools sufficient support. It has been more interested in what should have been done than in what actually has been done. Guidance has often been too far removed from practical work (*ibid.*, p. 44).
>
> Some of the project leaders have felt that they have been left alone in the school. The rest of the teachers have not always seemed interested in the project (...). Environmental education is of such a nature that the dynamics of the surrounding community should be considered more than they are at present. It is often a question of making changes in the content and operating principles of the project, something that is both slow and difficult to bring about. The spark of innovation should spring from inside the school community itself in order to be more clearly discernible in the goals set and, the results obtained (*ibid.*, p. 45)."

Environmental education as student-based (and teacher-based) action-research

The idea of student-based action-research as a characterisation of the learning process in issues-focused environmental education is significant in all those national reports, which depict schools as transcending the promotion of environmentalism, and the shaping of behaviour into environmentally friendly patterns. For example, the Belgium National Report (French) argues that environmental education "demands an interdisciplinary teaching approach that breaks with the tradition of social replication through transmission of a sacrosanct body of knowledge and values" (see Bustin, 1993, p. 17, in the Belgium report) and endorses a learning process which involves "pupils in active research leading to the achievement of a tangible goal" (*ibid.*, p. 19), which combines "knowledge and action in a truly practical way" (*ibid.*, p. 18). This is not research which simply produces knowledge to confirm a predetermined course of action, but a process of deliberation in which the ends-in-view (values) as well as the means of achieving them are being continually reinterpreted and revised. At the Technical Institute in Libramont, "the constant incursion of emotional elements (pupils were keenly conscious of the social dimension of what they were doing) into the project as it proceeded, kept turning it in directions that had not initially been planned''. This caused the teacher to reflect about the relationship between the new direction and their ''original intentions''.

The Australian national report depicts a similar process being fostered in ENSI schools, where the focus has been on complex socially controversial issues in their locality. It asserts that environmental education is ''unpredictable in its outcomes'' because when the focus is on real issues ''it is not possible to foresee the exact direction that the curriculum will take'' (Robottom, 1993, p. 69). The process of learning involved in action-research is well articulated in the Australian report as follows:

> ''As participants explore a particular environmental issue, their understandings of that issue change. Similarly as their understandings of the environmental issue change, the adequacy of their initial attempts to investigate (''solve'') the issue also changes, and needs to be progressively improved (*ibid.*, p. 69).''

It is through this process of action-research that students develop capacities for intelligent and responsible decision-making with respect to socially controversial environmental issues. They will not do so if their thinking is controlled through their teachers' understandings of issues and the solutions. This is what ENSI teachers in a number of participating countries have begun to realise; hence the emergence in their thinking of a significant difference between the promotion of a dogmatic environmentalism and environmental education. It is unlikely that they would have developed their understanding this far without engaging in the second order action-research process of gathering data about, reflecting on, and discussing the ways in which they influence students' thinking and conduct. And it is unlikely that the potential of the process they are articulating will be further developed without a continuing commitment to action-research as a process of professional development for environmental educators. The evidence of teachers' thinking presented in many of the national reports testify to the significance of action-research for achieving an educationally worthwhile and democratically justified form of environmental education in schools.

Quality Indicators and Innovation in Environmental Education

by

Michela Mayer

The image of learning

When looking at all the school curricula of all the countries in the world, from OECD countries to those of Eastern Europe and the Third World, one will note that they, at least in their general aims, reflect a wide progressive view of learning processes and the role of education. They talk of developing a critical spirit and an interdisciplinary approach, inviting teachers to link subjects with real life phenomena. Moreover they speak of teaching tolerance and participation in democratic ideals, and recognising the need for student-oriented learning.

Reality, however, shows that very little has changed in education and emphasizes the inherent difficulties in moving from theory, and good intentions, to practice. Even though many years have gone by, the same situation as the one Dewey described early in this century still persists (1966).

> "We are doubtless far from realising the potential efficacy of education as a constructive agency of improving society, from realising that it represents not only a development of children and youth, but also of the future society of which they will be constituents (p. 79)."

This fact is mentioned in many studies, even outside the field of environmental education. Nearly all the national ENSI reports recognise that the context of education has basically remained the same. The good intentions expressed in curricula do not reflect consistent teaching practice. In a document prepared for ENSI in 1991, Catherine Beattie emphasized the fact that many countries still had a predominantly "transmissive" form of teaching practice (Beattie, 1991). The Swedish national report talks of a "tardiness in the school": "So many good materials have been presented to teachers, so many national curricula, so many engaging talkers – and the school remains the same" (Axelsson, 1993, p. 55).

But is this "tardiness" the responsibility of teachers or is it due to the way innovation has so far been introduced in schools? Are not the many materials, detailed syllabuses, and textbooks the things that actually reinforce this static image of transmission in teaching and knowledge? Is it possible to continue wanting to "transmit to teachers" how to put a stop to this attitude of transmissive teaching?

Teachers, as well as students, take the conventional meaning of the words "practice what you preach" without adapting the concepts to their everyday experience. As mentioned in Slovenia's report, teachers learn:

> "To use the 'big words' to describe their aims (like the statements that stand at the front of curricula that nobody takes very seriously) (Pozarnic *et al.*, 1993, p. 497)."

Stenhouse had in 1975 already raised the question of the disproportion between attention placed on producing materials and that devoted to promoting the autonomy and professional self-development of teachers, and reaffirmed that there is innovation only when there is change, and just this "professionalism" and the need for security are among the obstacles to change:

> "As innovators teachers are asked to take on, initially at least, the burdens of incompetence."

Teachers' current professionalism is in itself "static" and, as well as the mastery of their particular subject, includes the need to keep situations under control, and therefore to limit students' independence inside schools. This practice corresponds with an implicit image of what learning is – essentially a transmission from someone who knows to someone who does not – and what "knowledge" is, of which schools are the repository: a set of information that is organised into disciplines and which is valid because it is "objective", detached from contingent phenomena, built and validated outside school and, naturally, not put into question.

Even in countries where "learning by doing" and problem-solving are a part of teaching practice, the student's active participation always lies within strictly defined contexts. At most, the teacher may simulate uncertainty, pretend not to know, in order to give students the idea that they too are doing "research", but in actual fact he knows the right answers, the methods to use and what knowledge the task involves right from the start. A lot of lab work, enquiry-based activities and environmental studies fall into this category.

In this case the image of learning, sometimes explicitly, is that of information processing, and if in transmissive teaching a pupil may be likened to a container to be filled, in "active" teaching instead he is like a machine that needs to be kept running or a computer that needs to be carefully "programmed".

Even if general outlines mention value judgements, meaning attribution processes and the importance of emotional and affective processes in learning, these concepts disappear when focussing on specifics and teaching practice. The concept of education as the source of "inputs" to which particular "outputs" necessarily must correspond remains unchanged. As Heinz von Foerster pointed out (1971):

> "Consider, for instance, the way our system of education is set up. The student enters school as an unpredictable 'non-trivial machine'. We don't know what answer he will give to a question. However, should he succeed in the system, the answers he gives to our questions must be known. They are the 'right' answers. Tests are devices to establish a measure of trivialization. A perfect score in a test is indicative

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of perfect trivialization: the student is completely predictable and thus can be admitted in the society."

If the ENSI project was something different, if one can say it was successful, it is not because it has introduced elements of environmental education into school curricula of over 200 schools, but because it showed how it is possible to modify "tacit knowledge" (Polanyi, 1966), the implicit images that teachers have as well as those of learning and knowledge.

The ENSI teachers were not given curricula or materials, but a set of values, both educational and environmental, on which to build their own contribution to the project, some more general objectives and the concrete situations – the school initiatives regarding the community – within which they were to be carried out. ENSI created contexts which led teachers to reflect on their own practice and to modify it.

The development of dynamic qualities as an assessment of the quality of learning

In the presentation of ENSI at the Linz Conference, it was emphasized that the study had "a double impetus: that of developing dynamic qualities in students through active pedagogical strategies, including action-research, and also to promote deeply rooted environmental awareness in students, teachers and those members of the community (...)" (OECD, 1991, p. 7).

As Elliott pointed out (1991, p. 22), the two objectives of the project may seem contradictory at first: awareness is commonly associated with possession of knowledge, information relating to the problem. It is implicitly assumed that it is necessary to know beforehand and then, once conscious of the problem, take decisions or initiatives. The emphasis on developing the students' dynamic qualities within school initiatives runs counter to this way of considering learning and is in contrast with the "static" structure of education. There is no "before" or "after" in this conception, but meaningful contexts for knowledge-construction through action and reflection on that action, and this knowledge includes not just information but experience, emotions and values.

The context which the ENSI project proposed to teachers turned out to be significant from two standpoints:

- it brought together environmental values and educational values; and
- it challenged teachers' expertise and their implicit image of learning-teaching processes.

The teachers were also asked to systematically reflect on what they were doing, and through this reflection and by practising action-research take on the responsibility for their conceptions of the nature of learning.

This teachers' independence, this responsibility in decision-making, has been fundamental and has led teachers to an identity crisis with respect to their own practice, by posing significant questions: where does teachers' independence end and that of students begin? How do you hand over "control" and at the same time maintain it?

In all the national reports which talk of school initiatives, the main story is an account of this transformation of implicit ideas on the nature of learning, the teacher's role and the school's role.

Reflection is an essential part of this transformation process and, for ENSI, it came about through the evaluation process of projects and the practice of action-research. Indeed, ENSI not only asked for a "report", but:

> "(...) was asking teachers to reflect and analyse initiatives in new and difficult ways – for evidence of change in pupils, parents and teachers; for pointers towards ideas about 'new knowledge' constructed through community-focused projects where pupil ownership was high; or reflections on complexity and dealing with potential controversy or conflict in environmental contexts (McAndrew and Pascoe, 1993, p. 23)."

Teachers therefore not only had to act but also reflect on their actions, assess them, and to make their educational values and ideas on learning explicit in order to find that coherence which they could previously ignore.

In moving along this path, the Swedish teachers quite independently and to their surprise found that "few students think they can influence what is going on in the classroom" (Axelsson, 1993, p. 32), and that "school work is founded on the experience of the teachers and their ideas about what important knowledge is. Pupils often have a different opinion" (*ibid.*, p. 49). In Denmark teachers found how difficult it was not only to actually "listen" to what children asked – and children's interest in pets, in "domestic animals", became in the teachers' interpretation an interest in farm animals – but also how difficult it was to develop real autonomy in students. It is not enough to just "set them free", but we need to build contexts and find that motivation to "trigger" pupils' commitment and interest, even if "the question of motivation does not arise in the same term as in traditional teaching" (Kyburz-Graber *et al.*, 1993, p. 49). The important thing for all countries was learning to propose "learning situations in which the children have enough freedom to develop their own interest in the topic" (*ibid.*).

Teachers "invented" teaching situations for ENSI that were different from usual ones, and this is a sign that something in the implicit education rules has changed, and that these new rules offer new opportunities, giving space to each person's imagination and experience. Even changing the simplest things – *e.g.* the physical organisation of the classroom – can help change more profound things, student involvement or the teacher's role.

It is not easy for teachers to "invent" new contexts, nor is it easy for students to "adapt" to them. As with any disturbance, a change in rules allows a move away from routine – from stationary equilibrium – and the search for a new equilibrium. But, if there is chance for reflection, it also allows us to recognise how much these old rules were often implied and considered as inevitable realities.

In this reflection the development of dynamic qualities necessary for intelligent critical action for the environment was reported in all the national reports as a sign, an indicator, that the project was developing in the right way: the pupils' newly found environmental awareness was not limited to just information or mechanically acquired behaviour, but was founded on new lasting abilities and attitudes.

The development of dynamic qualities may thus be viewed as a way of assessing ENSI project results: just like one of the "quality indicators" (Mayer, 1991) that may be used for coherent evaluation of processes triggered by environmental education and in order to replace those instruments based on old learning concepts, from behavioural objectives to performance indicators. And what is more important, this manner of assessing meets an actual need: it is the teachers themselves who try to assess their own projects in terms of the independence, responsibility, co-operation and solidarity shown by pupils.

To assess dynamic qualities, these must first be defined, recognised in different learning situations, and then linked to the various stages of the education process. Even though there are slight variations from one country to another, dynamic qualities are always interconnected in a network (Losito and Mayer, 1993, p. 50): there is no significant and effective independent action or decision-making that is not accompanied by sense of responsibility, which in turn is founded on co-operation and solidarity. This is why developed capacity for action and independence cannot be mistaken for a scarcely aware form of activism, in that they are always accompanied by reflection: "being action-oriented must not substitute the complementary element of reflection" (Thonhauser *et al.*, 1993, p. 231). Teachers discussed the dynamic qualities put forward by ENSI and in many countries underlined this complementary nature: Sweden suggested that "the ability to think and reflect should be included among the dynamic qualities needed" (Axelsson, 1993, p. 56); Italy also included "listening and empathetic skills", "the recognition and respect for others", "the attempt to make the most of differences" (Losito and Mayer, 1993, p. 47); in Scotland the children "had to persevere to see the results of their efforts" (McAndrew and Pascoe, 1993, p. 24).

Reflection, listening and perseverance are also "dynamic" qualities in that they contribute to structuring attitudes towards the environment and other people from within, and they show "activity" of understanding in which the pupil is conscious not so much of contents but of that which makes them important: underlying values.

Dynamic qualities are strongly correlated to values. Even when they are borne out in students in relation to environmental values and actions in a community context, their development is nevertheless a purely educational value.

An interesting contradiction is that dynamic qualities seem largely the same as those demanded and developed in Enterprise Education proposals: "(...) it could be postulated that dynamic qualities and enterprising behaviour (though not necessarily driven by a business/profit motive) can be roughly equated" (*ibid.*, p. 44).

Right from the first ENSI phase, the need to develop dynamic qualities was founded on an analysis (Posch, 1991, p. 98) of social changes carried out by the OECD-CERI studies on changing patterns of work: a general up-skilling of jobs, an increased emphasis on communication, social skills, polyvalent skills, and the readiness for continuous learning. However, changes in context and the fact that the goal is not profit still have some importance: critical reflection, consideration for others, solidarity, which are all part of the dynamic qualities developed by ENSI, are founded on purely educational values.

The risk of radical economy and efficiency is dangerous for environmental education and overall education just as much as environmentalism.

The construction of local knowledge

In the ENSI project the dynamic qualities were constructed through initiatives focusing on the local environment and community, and the necessary knowledge for supporting the action was constructed jointly by students and teachers.

The production of "local knowledge" (Posch, 1991) was one of the objectives shared by the ENSI project from the beginning. This did not come about without problems or difficulties, since the current school structure and teacher training has an opposite tendency: from generality – and systematic nature of disciplines – to the solution of local problems. In the ENSI project, however, the starting point is effectively the local and concrete problem, and the knowledge necessary to deal with it is always, even if only partly, new and purposely built.

The original assumption in the ENSI project was that knowledge could only be constructed through an individual process which gives meaning and value to experience and communication. If this is true, then the teacher's role must change. The teacher is traditionally, and at times unwittingly, used to transmit knowledge and must instead learn to pose meaningful contexts and "legitimate" questions – *i.e.* questions which do not have readily known answers (von Foerster, 1971) – within which students can "actively create their meanings" (Elliott, 1991).

This context-linked knowledge, "situational" in Elliott's words and "opportunistic" in the Australian report (p. 50), is significant because it is useful and usable in real life and not because it is part of the syllabus or because it is "objective and divorced from reality". On the contrary, value judgements, expectations and anything making experience important and meaningful, are part of this knowledge. This is not only "valid" because it is useful, but also "valuable" in that it is seen to be important for people. It is also an exemplary knowledge, in the sense that it provides an "example", an experience, of how knowledge is constructed.

Another "quality indicator" which can be used to assess the ENSI project is the transformation of teachers' implicit conceptions on what "knowledge" is and what "valid knowledge" is.

Giving value to local knowledge profoundly changes the image of education in society and the structure of teaching. The problem is not arranged by the teacher according to the concepts of the subject he wishes pupils to learn, but comes from outside, beyond his immediate control; teachers can no longer rely on their own knowledge – too general and too narrow at the same time – but must co-operate with others: colleagues, experts, parents or other members of the community. School thus becomes a focal point for producing the community's knowledge: not a "library" in which to file information gathered from past experience, but an active centre where a community gathers to debate and deal with its problems.

> "Even people who have not children at school might come. And people come to school and ask for help about ponds, about acid water in their wells, and about different environmental issues. The school is the place where knowledge is to be found (Axelsson, 1993, p. 43)."

Knowledge production is a collective thing in which the value of co-operation is heightened by results: if construction processes remain individual, the "production of local knowledge takes on the characteristics of a process that is largely collective and social" (Losito and Mayer, 1993, p. 81), where importance attributed to the problem stimulates the pooling, the communicating, of individual learning.

The message that students receive is one of confidence: confidence in their ability to deal with problems without delegating them to "experts" or to authorities, confidence in "understanding" as a means of transforming reality, confidence in teachers and education. This obviously does not come about without hindrance or difficulties, and requires profound change of teachers: the pupils of Geelong in Australia who draw attention to the pollution on their beaches, or those in Austria who claim the right to take part in planning their local park, or even the pupils of Pumperston primary school who take pride in their town, must face problems that do not so much concern the knowledge they need, but a change in attitudes and values. A new initiative needs to get over the lack of confidence and the community's resistance to change, through a difficult task of involvement where teachers, and at times head teachers, are in first place.

The development of teachers' dynamic qualities

Dynamic qualities are developed jointly by students and teachers in this process. If there is no independence on the part of teachers with respect to tradition, if there is no flexibility and ability to change one's own decisions, if there is no critical reflection and the ability to listen on the teacher's part, then there is none on the student's part either.

The difference between the two cases is the action within which dynamic qualities develop: for students the action is "environmental", for teachers it is "educational". Therefore, it is not a question of giving way or losing control on teachers' part, but of learning to shift control from a subject's contents to processes. Teachers and students are involved in the same action-reflection-action spiral, but with different contents.

The move from feeling responsible for school or class initiatives, in this case action for the environment, to feeling responsible for educational action is a transformation that somehow ENSI teachers had to or are still facing. Slovenia's report is exemplary in this sense:

> "In planning and carrying out those actions, it did not seem to matter to the teachers, to what extent the initiative and ideas came from them or from the pupils. They did not see their action mainly as 'educational' but as 'environmental' action (...). They would like to do something about these problems and may view pupils as helpers in this 'joint activism'. They sometimes forget that their main task is to enable pupils' learning. They lack reflective distance to ask themselves how to give pupils 'space' to develop their own ideas (Pozarnic *et al.*, 1993, p. 499)."

As a result, the first step for a teacher is to learn to "stand back" – "I was made much more aware of the 'child educating the teacher'. I had to stand back" (McAndrew and Pascoe, 1993, p. 25) – and to have confidence in students' possibilities:

> "I know I'm the environment co-ordinator, but eventually I'm not the leader of this, the children are basically the leaders, and for teachers it's hard to take a back seat because you know what you might like to see happening, but what I see happening is really fantastic. I'm prepared to let anything else that I thought might be great go because of what I see happening (Thonhauser *et al.*, 1993, p. 32)."

Finding the right balance between giving students freedom of initiative and keeping education processes under control is more difficult:

> "According to this approach, the teacher is no longer a repository of knowledge, nor is the student an empty container that must be filled. The teacher instead becomes a path facilitator in a route that is not rigidly determined at the outset but built 'together with' the pupils. We call this joint project-building 'co-creation' (see the Italian report, 1993, p. 64)."

> "I gradually ceased to work with pupils on those problems that seemed problematic to me, problems that they got to know through me. Now, instead, I help them to perceive, gather data, reflect, so that they build knowledge about where they live, what the threats are, what they themselves can do. In short, they have to decide how they intend to live in that kind of situation (Pozarnic *et al.*, 1993, p. 499)."

If the presence and development of dynamic qualities in students are indicators allowing assessment of the value of initiatives, the development of dynamic qualities in teachers is an indicator allowing assessment of the quality of the ENSI project as a whole. New expertise achieved by teachers does not in effect consist of mastering new knowledge or knowing how to use new materials: it is instead the ability to independently handle new and unexpected situations, an ability to reflect on their own conception of learning, that is destined to last.

Teachers' dynamic qualities, their flexibility and critical stance, allow passing from programmes to projects, and to follow students' initiatives beyond the confines of disciplines, keeping processes under control even when contents are not known at the outset. In the same way as pupils' initiatives, reflection by teachers on their work, and action-research, also allows knowledge-production. But knowledge produced now concerns education processes.

Even in this case, co-operation, being part of a group, having a situation which supports research, allows keeping insecurity under control and the development of freedom of thought and action. All of the ENSI reports acknowledged the importance of meetings between teachers of different schools but committed to the same reflection on teaching practice. ENSI and the reflection that ENSI proposed to teachers is an example of teacher training consistent with what curricula are preaching: a kind of training that promotes teachers' independence and professional self-development.

Handling value-issues

The ENSI project was explicitly founded on values: environmental values, but especially educational ones. However, as Peter Posch reminded us during the International Conference on "Values in environmental education" organised by Scotland, values may be divided into "espoused values" and "values in use", and the

> "discrepancy between 'espoused values' and 'values in use' may provide an explanation for some of the difficulties of values education. If those values that are transformed in behaviour are largely unconscious and unexamined it is understandable that 'espoused values' (the values we discuss and talk about) may not even touch those values that are realised in behaviour (Posch, 1993, p. 29)."

In the same way as for curricula, the problem is not one of explicitly sharing values or objectives or theories, but of recognising what values are actually present in practice in order to change them or to construct others that are more consistent with the statements of principle. This is why the ENSI project proposed:

- firstly, to make explicit those values, and assumptions, that always guide not only actions, but also the knowledge-construction process; and
- then to construct occasions so that educational and environmental values, on which the project was based, be really felt.

Just like knowledge, values too cannot "be transmitted" but must be constructed, generated, put into practice. This means changing what appear to be the main objectives of environmental education curricula: no more short term change of behaviour in the desired direction with respect to the environment, but the embracing of modes of thinking and action. Saying that knowledge produces awareness and sensitivity *per se*, and therefore behaviour consistent with new values is absolutely simplistic. You only need to reflect on the collective behaviour of our "cultured" western world to be convinced of this, or believe those old jokes which often reflect human behaviour: "I read in the Reader's Digest that smoking is bad for you; I stopped reading the Reader's Digest".

But it is enough just to listen to students and reflect on their behaviour, as was done in Veingeskolan (Sweden), for example:

> "Education about environmental questions in Swedish schools has given our pupils good theoretical knowledge. We, the teachers, have measured this knowledge with written test and given marks. As teachers we have rarely had time to study the pupils' view of the world and neither have we examined whether our teaching has influenced the attitudes and values of the students (Axelsson, 1993, p. 51)."

It is only through an analysis of essays on the theme "the Future" that teachers discover that:

> "In our secondary school the students show a remarkable negative view of life, especially the girls. Out of sixteen girls there are only 3 saying that the world will look brighter in 15 years time compared to today. The boys looking forward to a bright future (10 out of 17) hope for scientific solution to environmental problems (*ibid.*)."

> "Comparing these essays to those written by students one year younger in primary school having another teacher, one can see big differences (...). These students of course also have a more positive view of the future. This can only be interpreted in the way that teachers in our secondary school so far, have given the students a too pessimistic attitude as regards environmental education (Perugia Conference, 1992)."

Through this kind of study and reflection on the value of an educational process, teachers in all countries have denounced the negative nature of most environmental education: the one mainly directed to emergencies, aiming at educating in the correct behaviour through denouncing environmental damage. The result of this kind of measure is in effect fear of the future and a feeling of impotence, while the objective of environmental education is to:

> "give children a vision of the future that holds more than just the passive acceptance of what is there; that through empowerment they can influence the reality in which they live, they can make it better (McAndrew and Pascoe, 1993, p. 17)."

For this to happen, it is necessary to often construct, together and in practice, values that are not merely "espoused". Attention to local problems and community needs allows linking values with knowledge, creating affective links with one's environment, developing a concern that stems from a feeling of belonging.

Children put values "in use in their society" into question only when they perceive the importance of other values. The environment, and the natural environment, is not automatically a value, but is something which they must become familiar with, a kind of "taming". In *The Little Prince*, by Antoine de Saint-Exupéry (1943), the Prince asks the fox:

> "What does that mean – 'tame'? It is an act too often neglected, said the fox. It means to establish ties (...) if you tame me, then we shall need each other. To me, you will be unique in all the world."

To establish ties, to feel the need for a natural environment, all takes time, patience, memory and ritual; elements which are increasingly less "in use" in our society, but they also allow the setting up of affective ties with a small piece of that environment which students are called to respect.

Thus, a teacher of Peel Primary School in Scotland reflected on the project he was carrying on in this way:

> "I was very aware that our Woodland Project was taking up a lot of our class time (...). The children had reacted most sensitively to the beauty of our woodland, finding quiet corners and spaces to sit and reflect and listen to the sounds around them (*ibid.*, 1993, p. 12)."

In Germany, many felt that environmental education must involve "all the senses" and that:

> "The knowledge pupils learn in school is only 'head-knowledge'; this kind of knowledge is not sufficient to change behaviour, and consequently also 'heart-knowledge' and 'hands-knowledge' are needed (Pieters *et al.*, 1994, p. 14)."

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In Switzerland there was the clear understanding that:

> "The teaching does not concern the global environment which, in association with disaster scenario reports in the media, may give rise to fears, but is concerned with their own local environment. This is no longer called 'the environment', but rather 'my school path', 'our hedge', 'our pond' (Kyburz-Graber *et al.*, 1993, p. 49)."

This awareness is linked to the development of dynamic qualities:

> "From this point of view, the possibility of taking on new responsibilities towards the environment, of acting critically, of being aware and self-confident – in other words, the possibility of acquiring dynamic qualities – also necessarily passes through the ability to establish different relations with the environment in the widest sense. Not only 'acting for' the environment, then, but 'being' different in the environment (Losito and Mayer, 1993, p. 47)."

Being in the environment, the feeling of "belonging", allows first children and then adults to feel responsible, and to therefore have that caring attitude towards certain elements, natural or cultural, of our environment.

Listening to students and putting educational values in first place allows us to recognise that the problem is not one of transmitting certain values or to warn of other ones: the problem is one of bringing implicit assumptions into the open, of asking oneself whether practice is consistent with what is preached, and of comparing the different points of view – giving confidence to and recognising "value" in each one.

The teacher's role is very difficult in this situation: on the one hand, unable to refrain from rendering personal values explicit and, on the other, obligated to respect those of students. The difficulty the teacher finds when working with environmental education, as with any other kind of "education" which refers to values, is that of "believing in what you do while at the same time giving the opportunity for other beliefs" (*ibid.*, p. 76).

Open debate of values and conflicts is not just a way of bringing them to light, it is also a way of practising a fundamental value: the respect for differences. The fact that there be only one opinion at the end is not necessary: action may also be guided by doubt and by the need to better understand, and there is no need for unanimous agreement all the time. Independence and respect for differences are not just stated but become a value in use.

Understanding the complexity of real life

The problem of values is strictly connected with the problem of the image of knowledge. If the school system does not change its idea of what it considers to be "valid" knowledge, what to give value to, behaviour will be difficult to change. The fact is that the school system, like society, is – often unconsciously – immersed in that culture which Cini and Stengers call "the culture of machinism" (Perugia Conference, 1992) and has difficulty in accepting a culture of complexity.

Complexity was another key word in the ENSI project: it was proposed at an international level in the first phase of the ENSI research project as a characteristic of "natural" systems which counters the reductionism of "technical rationality" and which justifies and requires the development of dynamic qualities (Posch, 1991, p. 100).

In fact, the term complexity takes on different meanings in different contexts and in different cultural environments, both nationally and internationally. In some countries the term is often used in a "negative" way, meaning "complicated" – too difficult to understand with current knowledge levels – while in other cases the term takes up a widespread epistemological debate on the structure, organisation and limits of human knowledge and therefore on the "culture" that informs society and schools, and that teachers themselves help to reproduce.

The question is an epistemological one: does a different educational context also allow construction of a different kind of knowledge? or conversely, does constructing different behaviour perhaps require a different kind of knowledge? Must the "quality" of knowledge that is constructed in schools be changed or is it just a question of quantity?

The International Conference in Perugia (1992) – Images of Society, Nature and Science through Environmental Education – allowed aspects of complexity to be gathered and presented as the various teachers had perceived and translated them into their own experience. The problem of the complexity of knowledge, and not just of the "outside" environment, was taken up as a theme for reflection and research especially in France, Italy, Sweden and Spain. A first joint approach was the shift in attention from "objects" to "relations", trying not to simplify the problem too soon in its components and to deal with it "as a whole". The French report saw the environment as a "relational" concept (*relationnel*), and thus only defined in relation to questions posed and values attributed to it.

With this view of knowledge it is meaningless to argue for the existence of objective knowledge – "We can never identify how things are, especially in matters of people and their environment, without already interpreting what we find, implicitly preparing for decisions or making value judgements" (Stengers, 1992) – but it is necessary instead to compare and contrast the different points of view, and therefore values.

Environmental education thus puts forward a "global", "systemic" and "interdisciplinary" approach not because it deals with the problems of the planet or because it needs contributions from different disciplines, but because it allows study to focus a real concrete problem without prior simplification. This therefore needs a working method that should never lose sight of the problem in its overall context and which allows comparison and co-operation between differing points of view, value judgements and disciplines.

As the French report emphasized:

> "It is not the disciplines as such that establish the research object, but disciplines are mobilised to solve an environmental problem that already exists (see Clary, 1993, p. 29, in the French report)."

Having said this, we do not reject disciplines – or go against them (Pieters *et al.*, 1994) – because "to reject the primate of disciplinary knowledge" does not mean denying their use and importance. It means being aware that the problem is not solved by dividing it among disciplines: a system is not the sum of its parts and a map is not the territory. Disciplines, however, are of value as points of view, different "magnifying glasses" which help us to better understand and expand concepts.

> "This is the chosen space for school disciplines which, like magnifying glasses, serve to better distinguish something specific. It is here, and not before, that we discover the educational importance of disciplines created not to build self-contained worlds, cathedrals of knowledge in the desert, but privileged observers grasping the nuances of complexity (Losito and Mayer, 1993, p. 70)."

Reductionism is not in disciplines themselves but in the belief that only disciplines can define and solve problems. Pedagogically, all the attention devoted to problem-solving is also the result of reductionist thinking. Even if it can develop the ability to think, it forces students to concentrate on results. It makes them believe that it is right – and possible – to find quick effective solutions. However, this is true only when problems are not real, when questions are not "legitimate", and this is not what environmental education needs! Effectively understanding the problem is more important than actually solving it; there are often many different solutions depending on unforseeable circumstances. In any case, there are no short-cuts for the environment or in education: lasting results may be achieved only in the long term. A culture of complexity should avoid the mistakes of the many scientific and technological "solutions" which have contributed to creating just those environmental problems the world is facing today. Respect for complexity and long-term changes does not reduce the value of disciplines, but creates an awareness of their limits.

A certain kind of environmentalism is just as limiting as the technological society it is trying to combat: nature should not be respected as an "object" but as a "process", and the processes via which nature finds its "solutions" are non-linear, redundant, often random and unpredictable.

ENSI teachers have only just started moving in this direction, even though it is already showing how it could change the image of knowledge:

> "Our goal is to develop with our students a conscious holistic view of the complexity of the society. The students are to be given the chance to see the opportunity for individuals and groups to influence society and thereby acquire a positive belief in the future, a future in which their opinions are of importance (...). We want to teach from our students' point of view about the world, and not from a simplified 'teacher's view'. We would also like to point out that we do not plan everything from the beginning, as our work methods are based on student participation (Axelsson, 1993, p. 52)."

> "Students realize that a world in which each problem has only one possible categorical answer doesn't exist and that every action puts into play a series of relations with control and self-regulation mechanisms (p. 51)."

Some teachers expressed the view that a reality which can be dismantled according to the language of mathematics or physics, which can be controlled, developed and dominated at will, is fictitious. They drew attention to "a personal and group relationship that not only provides information on the environment, but also opens up the mind and feelings to the consciousness of man's place in the world'' (Losito and Mayer, 1993, p. 72).

The knowledge gained is different because it adds a new dimension to disciplinary knowledge, a new awareness.

In the same way as for an interdisciplinary approach, a global dimension is not achieved by increasing the amount of information and extending it to what is happening in other parts of the world, but by giving a ''global'' value even to small-scale actions that each person can take and showing true belief that ''the world is all connected'' (as the children of a nursery school near Milan discovered); start from what is near, then go further afield. This is how a child in a primary school in Italy explained her reason for ''adopting'' an abandoned little wood:

> ''To make people understand the things that are important to us and to set an example: starting from a little wood we can go on to save something much bigger (*ibid.*, p. 67).''

For some teachers, then, it is through ''processes'' rather than the achievement of certain results that environmental education is realised. As the Spanish report emphasized, in education processes ''the means is the message'', and consequently ''the process itself leads to the accomplishment of certain objectives'' (see Lara and Pardo, 1994, p. 13, in the Spanish report).

Uncertainty and risk

Risk, uncertainty and the awareness of limits are part of these processes which construct a culture of complexity and which ENSI co-operated in implementing. In the Linz conference in 1988, Laura Conti had already alerted teachers to the growing faith in the possibility of science and technology shaping the future:

> ''A significant aspect of environmental education must be teaching that, although we can widen the scope of our forecasting, some area will remain unpredictable. To forget this would be yet another sign of the dangerous technological pride which is currently costing us dearly: remembering this means having the foresight to remain constantly on our guard so that we can recognise the unpredictable as soon as it appears (Conti, 1991).''

Education and environment pose problems that require investment for the future, and therefore need long-term planning; the issues which they raise are always controversial, as a result of conflicts between different scales of values and images of the world.

On the other hand, society tends to seek to limit conflict. Environmental education, or at least the kind of environmental education envisaged by the ENSI project, calls for facing risks and recognising these uncertainties and limits. Indeed, it wanted people to realise that possibilities have constraints and to acknowledge that there is no real independence without risk.

In the mid-1970s, discussing environmental education during a keynote address to the Australian Curriculum Development Centre (unpublished), Stenhouse said:

> "Children have a right to demand that the school give them intellectual and emotional confidence and competence by offering them progressive understanding of knowledge and progressive mastery of skills. This demands transferability of understandings and skills, the building of significant perspectives on the world and also the right to experiment and hence to take risks and to make errors."

Accepting risk and unpredictability of situations demands a different kind of independence and self-confidence: confidence shifts from confidence in contents – established rules, data, methods – to confidence in processes that allow to eliminate but to keep error and conflict under control. The dynamic qualities that develop in a cognitive framework aware of complexity can still be called independence, responsibility and self-confidence, but take on different meanings.

The ability to handle the unforeseen is not only required of students, but above all of teachers who have to abandon the certainty of rigid and detailed programming when dealing with environmental education projects:

> "My habit of wanting everything under control, to programme and make the students 'trot along', as well as my scientific deterministic training, were in opposition to the need to practice listening, to guide reflection, to find the way to 'observe my teaching', to accept the students' views as a fundamental element of our dialogue (Losito and Mayer, 1993, p. 73)."

> "Freedom in uncertainty. I did not know where this was going to lead us. For some time, I felt lost. Little by little, the process got momentum, pupils had so much energy and numerous ideas. My task was different from before, but I started to enjoy it (Pozarnic *et al.*, 1993, p. 50)."

There are no predetermined rules or "magic words" for every situation in this way of educating: the problem in effect is not teaching sustainable development or respect for the environment, but of understanding what this means in the concrete situation the pupils are living. If problems are also global, then each situation is unique, and solutions are always tentative and linked to context.

> "The teacher is not a book that preserves unchanging knowledge, rather he is a sailor who adapts to the changing conditions of the sea (Losito and Mayer, 1993, p. 73)."

Realising that not only it is possible to act in conditions of uncertainty, but indeed that it is necessary to act in situations of uncertainty, seeing that a real situation never evolves in a completely predictable manner, allows teachers "to remain on our guard", as Laura Conti suggested. ENSI proposed action-research and reflection on action as an instrument of awareness and action in situations of uncertainty. In this way students and teachers can "maintain control", not necessarily on short-term results of their actions, but on the processes they are implementing.

This was not really easy, indeed the teachers in Denmark described in their case study how difficult it was to offer students independence and freedom while at the same time keeping education processes under control. Moreover, they mentioned how difficult it was for students to accept this independence and to do without answers that were just in "black and white". The Finnish report recognised that:

> "The extraction of new knowledge from local sources and connecting it to other available data need a lot more curricular development on the national level and additional further training for teachers. Students often lack the courage to connect their own experiences to data they had gleaned out of books. Some of the students (...) did not have the courage to use their knowledge. The book knowledge was seen safer and the knowledge generated by own their research findings too risky (Kurtakko *et al.*, 1993, p. 59)."

The teachers had the same problem: taking on "the burden of incompetence" which environmental education, and the ENSI project, required was not easy. It is not easy to change, sometimes radically, one's image of teaching and knowledge. The "pedagogical support", composed of one or more expert researchers and the national network, allowed people in most of the countries to go from fear and uncertainty to confidence.

> "It's a nice feeling to discover that you're not the only one struggling (being a teacher is often a lonely job) and of course still better to have people from different schools to discuss problem with. Many good ideas and solutions were shared on these meetings (see Benedict and Sandas, 1994, p. 77, in the Norwegian Report)."

ENSI did not only "preach" the need to act even in uncertainty, but also contributed to creating a context in which this was possible.

Is it possible to think of the spreading of such a "complex" experience? In some fields they say there is a barrier of 25 per cent to the spreading of innovation. But let us see the question from another viewpoint: if innovation is real, if change is profound and destined to last, is it really possible to involve more than 25 per cent of teachers? It is not a question of numbers once again, but of values and the quality of what is hoped to be achieved. If the educational values on which ENSI was based are shared, if it is recognised that there is no real environmental education without changing values, and with them the image of knowledge and teaching-learning processes, then the problem is not one of spreading innovation but of supporting this view of innovation and of extending it even beyond environmental education.

ENSI allowed us to recognise the fact that curricula, materials, books and training courses are not the proper instruments for sustaining real and profound innovation, and that instead it is necessary to encourage the "dynamic qualities" of teachers who put forward significant aims and offer instruments with which to reflect on one's own institutional and teaching support and practice.

Professional Development in Environmental Education: Networking and Infrastructures

by

Peter Posch

Networks of communication and "joint ventures" are international phenomena and in part results of increasing complexity in industrialised societies. To be able to cope with complexity and uncertainty, individuals and institutions are forced to actively create relationships with each other. These "dynamic" networks complement and to some extent even replace the traditional hierarchical relationships that previously characterised the infrastructure of social life. The first Section of this report deals with the emergence of these networks in schools when teachers and students involve themselves in environmental initiatives. Dynamic networks provide a powerful framework for professional development. Their main features are described in the second Section. In order to develop their potential, dynamic networks need an organisational infrastructure. Different infrastructures have been developed in different countries. Some of their strengths and weaknesses are analysed in the third section.

Dynamic networks

The essential feature of dynamic networks is the autonomous and flexible establishment of relationships to assist responsible action in the face of complexity and uncertainty. They are answers to specific situational characteristics:

- "low-structured" situations, in which often even the problems are in need of being defined, call for specific knowledge to cope with them; "general knowledge" is not sufficient;
- this specific knowledge can only be generated within the situations and by those persons who through their action (or non-action) are elements of it. It cannot be produced in another context but is derived from a "situational understanding" (Elliott and Rice, 1990); and

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- the knowledge thus generated is not applied instrumentally to solve the problems but expresses itself holistically in actions comprising cognitions, value orientations, and feelings.

Dynamic networks contradict one of the traditional assumptions of schooling: the assumption of a separation of school and society. If dynamic networks develop it is difficult to say where the educational organisation ends and where society and its abundance of personal and institutional relationships begins. It is interesting that quite similar developments have been identified in the economic system (Ochsenbauer, 1989, p. 264).

Dynamic networks are in a sense an extension of the idea of specialisation by providing access to a variety of external resources (and know-how) to teachers as well as students. Dynamic networks are generally initiated and sustained by the teachers and students of one or more schools. The following examples are taken from the country reports and illustrate the variety of such networks.

A school network for a joint purpose

A typical example is the Water Analysis Project (Mantova) comprising teachers and students of five vocational secondary schools and a number of local and regional institutions. These schools co-operated for several years to study the quality and the degree of pollution of ground and surface waters in the communities of Mantova. The activities were co-ordinated by a group of students and teachers and were financed by the communities on the basis of contracts. The responsibilities of the pupils ranged from the selection and drawing of water samples and on the spot analysis, via a detailed chemical, bacteriological and micro-plancton analysis in their school laboratories to reporting and discussing the results with the authorities (Sutti, 1991, and personal communications). In 1991, this project was extended to comprise 13 junior schools. The older students of the original five schools now acted as tutors to the younger ones, trained them, invited them into their schools for laboratory work and visited them. It seemed that the mere fact of a close co-operation with younger students also widened the perspective of the project from a rather narrow technical orientation to a broader more holistic one including artistic and social aspects (Project Mincio, 1992).

The children's parliament

A different kind of dynamic network is the "children's parliament" (an idea originally coming from France) organised by an ENSI school teacher (Elke Ammann) in Western Austria (Thonhauser *et al.*, 1993, p. 47). It links a number of elementary and lower secondary schools of a community and gives children of these schools the opportunity to develop and submit proposals for improvements in their environment to their mayor and the aldermen and subsequently discuss them in public.

The children develop ideas, organise them in projects, implement them to the extent that this is possible in the framework of their classes and present the results of these activities through elected representatives ("parliamentarians") to a democratic forum. Those bearing political responsibility (the participating mayor and councillors of the community) are expected to take the proposals seriously and give adequate answers to questions that are asked. The network is heavily supported by the local community for example (which provides secretarial assistance). The positive experience with the first two plenary meetings in 1992 and 1993 stimulated further initiatives. Thus, a network newsletter is planned to facilitate mutual information, inter-school projects are planned to better cover the entire city area and to strengthen the relationships established by the school network.

Dynamic networks differ in several respects from hierarchical structures of communication (Fischer-Kowalski, 1991; see also Clary, 1993, p. 27, in the French report):

- The relationship between the persons involved is not one of subordination and superordination but is relatively symmetrical.
- There is a positive cost/benefit relationship for each participant. Each person gets at least as much out of the interaction as she/he invests in it.
- Dynamic networks are constituted by ongoing exchange processes (*e.g.* by comparing, influencing, learning).
- Dynamic networks do not develop along pre-specified routes but are stimulated by the perception of shared interests. The decision to participate is a matter of negotiation between the parties concerned. Relationships can develop quite spontaneously. A Finnish teacher whose students were concerned with waste problems found out about an Austrian ENSI primary school which had already taken initiatives in the field. The Finnish students presented themselves and their concerns in written form, on tape and with slides and the exchange started with a high level of involvement on both sides (Kurtakko *et al.*, 1993, p. 15 and E. Ammann, personal communication).
- The duration of dynamic networks can vary. They can have a relatively stable long-term character (such as the Water Analysis Project). Others are of relatively short duration as illustrated by the Pello school in Finland (*ibid.*, p. 16), which "has received many visitors who have asked for practical advice when initiating environmental projects in their own schools".
- Each participant in a dynamic network can be involved in a potentially unlimited number of interactions. New relationships (or new dimensions within a relationship) can be developed without having to give up the existing ones (although they may be less used). This contrasts sharply with a hierarchical structure in which new relationships have to be defined by another rank (*e.g.* by a new boss) and in general substitute the old ones.

Dynamic networks are specific ways of utilising human potentialities for joint enterprises and for mutual learning and assistance. According to Ernest House (1974), one of the reasons why the enormous effort directed toward "restructuring" schools produces relatively little effect may lie in "the vertical division of labour, as prescribed in the research, development diffusion paradigm of change. A horizontal division of labour would bring the invention, production, and distribution of innovations closer to the people who must use them so that they will be more useful in conception, better implemented, and will produce fewer inequities. The features of such a horizontal division of labour might mean shorter, less alienating development cycles where participants can see and understand what is going on and have immediate control. This would mean more self-reliance and the utilisation of the local, indigenous expertise and resources at hand''.

The emergence of dynamic networks in environmental education exemplifies such a horizontal division of labour. ''The network idea (...) sought to replace rigid control from the centre by a process of negotiation partnership and consensus (see the Irish report, Department of Education, 1994, p. 16).''

The main strengths of dynamic networks are their functional integration into the activities of an environmental project. They are results of initiatives taken by teachers and students of the schools concerned. The usefulness of investments in the network can therefore relatively easily be discerned by all participants. A weakness of these networks is their relatively low institutional stability because they are anchored in specific school initiatives. They are limited to those persons, groups or institutions which are expected to contribute to the schools' project activities. The conclusion of the project therefore, in general, is also the end of the network. Another limiting factor of dynamic networks is size. If they grow larger, the demands on time and management capacity increase rapidly. There are, however, attempts to stabilise such networks, *e.g.* by integrating such an environmental project into the mainstream curriculum. This was accomplished by the Water Analysis Project (Sutti, 1991).

Dynamic networks and professional development

Dynamic networks appear to be an increasingly important framework for professional development. They permit the effective utilisation of know-how, abilities and energies that already exist in the teaching profession. The following features of dynamic networks should give an idea of this potential and its prerequisites.

Co-operation is a result of the nature of tasks

Dynamic networks develop if co-operation is needed in order to accomplish what teachers and students want to accomplish. Co-operation among teachers students and ''third parties'' is not just a matter of ''good will'' but depends on the character of the tasks encountered. Typical tasks which demand co-operation are attempts to generate local knowledge on environmental issues or to change environmental conditions. If projects are aimed ''at solving real problems, in a real situation, a partnership with decision-makers, local authorities or non-governmental organisations is essential'' (see Clary, 1993, p. 16, in the French report). Nearly every country report provides examples of this need to co-operate. In Skælskør School in Denmark, for example, natural science teachers offered advice to other teachers to assist them in overcoming barriers of natural science aspects of projects. The ''arrangement had made it possible (for a history teacher) not only to comply with the pupils' wish to work with environmental problems, but it had also been possible to let the pupils choose what problems they would work with. It had been demanding but it could be done in a professionally sound way'' (Christensen, 1993, p. 21).

The following example (Axelsson, 1993, p. 43) gives a vivid illustration of the need to create links if a school moves from knowledge transmission to knowledge utilisation. All teachers and students of Pårydskolan in Sweden have taken up challenges in their own vicinity and reserved two hours per week for environmental projects. They started from their own interests and from requests from outside. A parent, for example, had ponds that were now overgrown with trees and plants – could the school help them with these? The school has now fish breeding in the ponds. Similar initiatives resulted in a shop in which the school sells environmentally friendly detergents, in a green house, and in the restoration of a water mill. Some of these initiatives involved hard work. If it turned out too hard for students to do themselves, parents came to the school on Saturdays to help. ''The school has managed (...) to become the centre in the small village (...). People also come to school asking for help about ponds, about acid water in their wells, and about different environmental issues. The school is a place where knowledge is to be found.''

The report from the French-speaking community of Belgium (see Bustin, 1993, p. 14, 20 in the Documentation for the ENSI study list) reveals some characteristics of the emerging relationships between children involved in an environmental initiative and other parties. The third year pupils of a school in the French speaking community of Belgium acted on a request by the Solvay Industrial Group to recover plastic (PVC) bottles by setting up a sorting and storage centre open to the people of the commune: ''They canvassed not only the other pupils and teachers of the school but also the local population, the commune authorities and the press.'' One of the major practical problems they had to cope with, was to persuade the commune authorities to run the storage centre during the summer holidays. In September 1993, the commune authorities, at the children's suggestion, proposed organising a container park and the responsibility for action moved over to politicians.

The initiative of the school was well timed. First, the inspectorate for elementary education was encouraging teachers to take steps in favour of environmental education. Second, it was started just a few weeks before the Rio summit. There the Minister of the Environment used the initiative as a positive example which in turn had consequences for the school: the children were invited to visit schools in Brazil. After their trip the pupils invented another side of the project: the idea to establish an exchange with Brazilian schools facing social and environmental problems. ''Beginning with a local initiative, the pupils quite naturally moved on to a more world-encompassing project that enters into the framework of necessary North-South solidarity.'' This example illustrates salient features of networking.

a) Dynamic networks are not super-structures searching for a ''raison-d'être''

Rather they emerge from an environmental initiative and are in a sense ''logical'' results of its design. The co-operation of the community was in a sense ''needed'' in order to sustain the initiative. This need provided the basis for the co-operation.

b) Dynamic networks are time-bound

In this example the contacts between the school and the other partners had fulfilled their purpose when the commune had taken over responsibility. They had come to an end but it is likely that the potential for their activation in the future was higher than at the beginning of the initiative.

c) Good timing is an important condition for networking

Dynamic networks are based on mutual interests. Some of the motives of the commune politicians to assist the pupils in establishing the sorting and storage centre (*e.g.* their interest in re-election) may have been quite different from those of the students. Nonetheless, the centre was the result of a linkage between these interests. Dynamic networks, in this sense, have a micropolitical dimension.

Competence and support are accessible

Dynamic networks among teachers develop if innovative activities are accessible to other teachers, *e.g.* by opportunities to visit teachers whose work appears to be interesting or to invite them into one's own school. Two of the ENSI Schools in Scotland (Peel primary and Inveralmond high) shared some visiting teachers "so there was an opportunity for both schools to benefit from one another; a mutual understanding had developed of what Peel primary school's environmental ethos was and the contribution which the secondary schools' subject expertise could make to its environmental work" (McAndrew and Pascoe, 1993, p. 51).

Observing how other teachers and students develop their initiatives and discussing with them how they cope with difficulties and how they utilise strengths can be a powerful stimulus to innovate (*cf.* Ekholm 1988). Although experiences gained in one complex situation cannot be technically applied to other complex situations, a direct or mediated understanding of an innovation of another teacher can generate a set of illuminating hypotheses which allow a fresh perspective of one's own situation. One can grasp an idea that materialised in one context and can use its power to construct one's own concretisation, adapted to one's own situational context and personal strengths and weaknesses. The result then is not a copy nor an application of a general principle but is a new solution for which ownership can be claimed. In this sense, dynamic networks provide cross-situational links which allow a "reflective transformation of ideas" and thereby a spread of innovative activities without "disseminating" anything, in a technical sense. "From the evaluations we received from teachers it is apparent that the opportunity to learn from others and reflect on their own work has given fresh impetus to their commitment to developing environmental education in their schools" (*ibid.*, 1993, p. 46).

Another example of this phenomenon is the network "energy workshop" (Thonhauser *et al.*, 1993, p. 48). With their teacher, pupils of a secondary school in Austria developed a municipal energy saving concept which was at first (1989) tailored to meet the needs of a small local community. The project consisted in analysing the supply of, and demand for, energy for each building, pointing out future perspectives and giving advice in matters of energy to the local authorities and to individual households. In subsequent years it was further elaborated and also involved local enterprises (*e.g.* chimney sweepers and plumbers). Schools in other parts of Austria became interested and were given the opportunity to learn about the concept on site and/or be visited. A teacher and a few students of the school where it originated were invited by several schools to give short introductory seminars on the project and to give advice. In the meantime 18 schools participate in the network, each realising an individual version of the original idea. In the meantime also computer software and a manual have been developed and a network newsletter serves as a platform for mutual information.

An atmosphere of mutual trust is created

Any innovation – especially school initiatives that depart from the transmission mode of teaching – can be (and often is) interpreted as a threat to prevailing interpretations of the tasks of teachers and to the persons who practice them. This is made quite clear in the Swiss report: "Active teaching exerts pressure to others (...). One does not like to destabilise one's colleagues or let them know indirectly that they could do more" (Kyburz-Graber *et al.*, 1993, p. 29).

As a result many project teachers report little understanding for their activities on the part of their colleagues. Most of them are strong personalities, who "do not feel the urge to be loved by everybody" (Elliott, 1989).

This state of affairs, however, is not a good starting point for spreading an innovation or – as seen from the perspective of an interested teacher – for starting a school initiative in environmental education. "The real problems with the implementation of environmental education are of a social nature (to be) recognised and accepted and be able to defend the objectives defined for environmental education before the parents and the authorities. All this requires a collaboration (*ibid.*, p. 48)." Many of those who still involve themselves and risk negative reactions by colleagues do it because they are part of a social group in which not only high mutual expectations develop but also respect and trust are practised.

Personal, informal contacts are breeding grounds for dynamic networks. "Ideas move along the social network of personal acquaintance (House, 1974, p. 10)." Dynamic networks develop if personal relationships are created and if mutual trust is being built up. In a group involved in a project "there must already be an atmosphere of mutual trust, a network of affective relations able to integrate each person's experience" (Losito and Mayer, 1993, p. 58). "Building a relationship of trust and mutual understanding, establishing realistic goals and maintaining good communication were (...) paramount (McAndrew and Pascoe, 1993, p. 50)."

The building of the ENSI teams in the different countries shows the important role of a "group spirit". The development of mutual acceptance and trust needed loosely structured and self-organised opportunities to get to know each other. A "fundamental element for developing a group spirit both in teachers and in students that work on an environmental education project together is the collective use of 'free time' (...). Chatting, walks, songs, games, all generally self-managed (...) were a cohesive element for the group (Losito and Mayer, 1993, p. 15)". Also the continuity of relationships seems to play an important role: "The periodic meetings of the groups were considered important and if only one teacher per school could participate this was considered a problem (Kurtakko *et al.*, 1993, p. 48)."

Professional knowledge is generated by teachers

Dynamic networks develop if teachers produce professional knowledge about their work. Teachers who leave the "stable state" of systematic knowledge transmission have to cope with open-ended, uncertain, unpredictable, sometimes contradictory situations, entailing risks. The professional knowledge that is necessary to cope with such situations can only partially be transmitted in advance; most of it has to be produced by the practitioners themselves reflecting on what they do, clarifying their own values and developing their practices (Elliott, 1989; Altrichter *et al.*, 1993). The practicalities of mutual assistance in gathering and interpreting data are a basis from which professional communication and sharing of knowledge may emerge. The Italian report gives a vivid illustration:

> "From October 1991, the research group worked in subgroups – always including a mix of different school levels and competence (...). The three chosen themes of action-research, dynamic quality and complexity, although interlinked, provided the guiding thread. The projects carried out by the schools were the raw materials on which to reflect and discuss. Each meeting required teachers' contributions: reflections on the development of dynamic qualities within one's own project or reflections on complexity; an example of data gathering; the outline of the school report, etc. (...). We added some element for reflection and stimulation in every meeting: articles questionnaires, role-play and simulations (Losito and Mayer, 1993, p. 15)."

Another initiative to use a research element for network building is reported from Finland (Kurtakko *et al.*, 1993, p. 37). Schools were asked to invite at least two other persons (teachers, students, parents, representatives of the local school authority or local media, etc.) not directly involved in their environmental initiative to evaluate the project. Starting points were issues and questions defined by the school. This is a kind of extended peer review. It is probably an effective means not only to learn from other people's perceptions but also to stimulate their personal involvement. By being asked to evaluate an activity, they are challenged to seriously reflect on available data and they are able to "leave traces" by being given a voice. Both are likely to induce some of these persons to involve themselves in similar initiatives.

Infrastructures for dynamic networks and professional development

The growth of dynamic networks – and at the same time a smooth transition to a more dynamic learning culture – is highly dependent on a re-definition of the role of educational support. The most difficult reorientation will be to complement technical rationality and the doctrine of "transferability" by a reflective rationality and a logic of "supporting growth". The doctrine of transferability implies that innovations can be developed and tested outside schools and be transferred to them. The logic of supporting growth is based on the understanding that local initiatives exist already and that their growth process can be supported symbolically and instrumentally (House, 1974).

House (1974, p. 243) provides another metaphor to indicate the direction of this shift. "Government activity should be stimulating and regulating like withdrawing or inserting a lead rod in an atomic stock pile (...). Directions and energies must be mobilised within the system itself." The metaphor should not be overstrained but it acknowledges that innovative potential is already there. It need not be imported and imposed. Moreover, if specific innovations are forced upon schools this tends to reduce their coping power and problem-solving capacity and increases their dependence. This understanding implies a fundamental change in perspective on the side of educational support.

The national reports present a number of strategies intended to promote the development of dynamic networks and to use their capacity for professional development. Some of these strategies will be analysed in this chapter.

The Norwegian national projects

A key element in the Norwegian environmental education policy appears to be the support of a programme of national research and development projects. They are intended to enable networking between schools and universities, research institutes, trade, industry, non-governmental organisations and local and central government agencies. Projects have been designed to cover such themes as radioactivity, energy, waste, fresh water, coasts, oceans, and forests. These projects have certain features in common, namely a local, national, and international focus, the need for fieldwork, the creation of data bases, the aspiration to co-operate with local authorities and other public agencies.

An example of such a project is VANDA (see Benedict and Sandas, 1994, p. 33 in the Norwegian report, and the Norwegian in-depth study, p. 5). It is described as a co-operative project in environmental science and electronic data processing between the University of Bergen and upper secondary schools in Norway. Like most other projects it has a strong natural science orientation. This project requires each participating school to select a lake in its neighbourhood for regular monitoring and ecological studies. The university provides guidelines and equipment for sampling and data collection. The teachers organise field trips to "their" lake in order to collect biological and water samples. These samples are sent to the university for certification and analysis. Each school receives a report of the results referring to its particular lake and has access to the national data base enabling it to make comparisons between its own site and other sites in Norway.

Projects of this kind are superstructures for networking schools with other institutions. Some of their strengths are: teachers and students can generate potentially useful knowledge for research purposes (*e.g.* comparisons over place and time) and/or for environmental monitoring (*e.g.* early warning); teachers and students gain access to the knowledge base of other institutions. Both features show that the idea of national projects is a powerful one. But there are also dangers: the stronger the central project management (in this example the university) controls the process (by defining problems, procedures and quality criteria) the less will probably be its power to stimulate teachers and students, because their opportunity to develop ownership and "leave personal traces" may become marginal. The more it starts from a deficit philosophy ("teachers do not know enough to teach about the environment in a dynamic way, so we have to educate them") the more teachers will probably assume a passive role and limit their activities to following prescriptions for data provision to a central institution. If the collection of data is not an element in a more complex school initiative intended to shape the environment in a visible way, the perception of its usefulness by teachers and students may be rather limited.

The contribution of national projects to education (and not only to the collection of useful data) depends on their ability to allow and even to stimulate teachers to stay in control of problem definition, procedures and quality control. This task is the more difficult the farther away from schools the management of these projects is situated. An evaluation of the Norwegian national project initiative could provide valuable experiences, especially as similar developments are emerging in other countries (see Döry, 1993, p. 37, in the Hungarian report) and – initiated by the United States – on a global scale (Gore, 1994).

The German Environmental Centres

The German participation in ENSI has been used to study the impact of environmental education centres and to identify possibilities to develop co-operation with schools. There are more than 200 environmental centres of various kinds in Germany. Most of them are involved in educational activities of some sort. The majority of them offer opportunities to "experience nature". The report describes some of their potentialities (qualified and highly motivated personnel, resources, specialised programme, etc.) but also points out problems: the activities are sometimes limited to nature studies and neglect current and/or controversial environmental concerns. Often teachers "hand their classes in at the reception and themselves take no further part in the activities of the centre, so that the learning experience of the centre remains for many pupils isolated from teaching in school" (see Bolscho, 1993, p. 51, in the German report). The ENSI contribution in Germany is intended to "break down this isolation" and provides some examples, *e.g.* the initiative of an elementary school teacher who actively used a recycling station to make children conscious of the implications of the thoughtless use of batteries.

Environmental centres can play an important part in supporting environmental school initiatives. To make the most of this potentiality, two conditions seem important:

a) The concept of the environment should be a broad one: a reduced understanding of the environment, limiting it to "nature" (*i.e.* environment with a low level of human intervention) may be counter-productive because it hardly touches the every-day experiences of students. It may be perceived as a (pleasant) experience of nature consumption in line with other kinds of consumption but without any effect on the students' style of every-day life or on the conditions supporting it. Environmental centres, therefore, should have a "generalist" emphasis and should also tackle issues of alternative technology, alternative economy, alternative housing. However, there remains a tension to be coped with between the self-confidence gained by specialist expertise and the flexibility and relevance achieved by a generalist orientation.

b) Environmental centres should have several "identities": one is the identity as provider of direct experiences with nature, and of information by courses, lectures, materials, events, etc. This is a well-established identity of most centres. The second is the identity of defining problems and acting to solve them in their own immediate environment. They should do what they preach and be examples of civic initiatives to improve the environment. The third identity is probably the most difficult one: environmental centres should actively attempt to identify environmental initiatives in other institutions, especially schools. They should assist them in becoming visible, encourage and support them (*e.g.* by providing know-how if requested, by arranging contacts with experts, etc.).

This task is a hard one because it implies an explicit devolution of influence from the provider to the user. However, it is the identity with the highest potential effect. It follows the "growth" paradigm and can contribute to the development of schools into environmental centres themselves. However, this can only be expected if the initiative and the responsibility are left where the (potential) action has to take place. This may be a frustrating process for experts who believe they know most of the problems and solutions already.

To conclude the dimensions of ENSI will be used to formulate a few questions which appear to be important if environmental centres intend to become structural frameworks for networking environmental school initiatives.

Personal experience: in what form and intensity does the centre provide access to personal experiences with environmental issues? How broad are the areas in which such experiences can be offered?

Interdisciplinary study and research: what is the relationship between structured courses and materials on the one hand and opportunities for students on the other to use the centre's personal and material resources to do their own investigations based on their own backgrounds and interests?

Responsible action: how far is the centre itself a good example of such action on environmental conditions?

Involvement of students in decision-making: what is the relationship between the missionary-concept and the professional service-concept of the centre? In how far are students allowed "to matter" and to accept responsibility for what they do? And how are they held accountable by involving them in reflecting and communicating on their work?

In short, environmental centres can play an important role but they cannot play it alone. They need to become active elements within a tightly-knit network of environmentally active institutions and groups of people.

The Dutch management structure for distributing funds for environmental education

In the Netherlands, a multi-year plan was established to incorporate environmental education in all schools (see Keurentjes *et al.*, 1994, p. 30, in the Dutch report). Its tasks are to manage and distribute available funds on the basis of proposals by schools, give advice on environmental education strategies, facilitate the distribution of positive results and materials, detect "white spots" in supply and development, strengthen regional networks and local support structures, stimulate communication and get influential support groups involved. Six ministries provide the financial backing and agreed in 1992 to establish a management structure outside the educational bureaucracy and the "Environmental Education-World". Four process managers were appointed (one for each educational sector: primary, secondary, vocational, and agricultural) to co-ordinate the efforts. The management team is guided by an interministerial steering group and advised by platforms of intermediary organisations. Basic guidelines for the distribution of funds include attempts to integrate environmental education in different subjects and to institutionalise environmental care inside schools. Funds are distributed in part directly to schools and in a major part to support-institutes and NGOs that co-operate with schools.

An important aim is to reinforce self-supporting structures at a regional level. Many projects therefore involve network building at local or regional level. The four managers are requested to design specific strategies for their sector.

In the primary sector, 70 projects involving 500 pilot schools have been financed in the first year, whereas in the second year the focus is intended to be on the exchange of experience with other schools.

In the secondary sector a close working relationship is established with regional consultants and other intermediary organisations that co-ordinate and support initiatives of groups of schools (*e.g.* 80 local centres are equipped with CD-ROM players to be able to show examples of environmental education when visiting schools). The schools receive a budget to devote time and teaching hours to their initiatives.

In the vocational sector money is distributed on the basis of proposals by schools and support organisations. One of the adoption criteria is that project leaders present a co-operation scheme with other interested schools. Another criterion is that 20 per cent of the costs must be borne by the school.

In the agricultural education sector, each centre has appointed "one 'networker', whose task is to stimulate his colleagues to integrate environmental aspects in their teaching. It is a 'person to person' approach, aiming at quality rather than quantity. Each networker is exempt from teaching for one day a week" (*ibid.*, 1994, p. 45). Training for these networkers is provided by a national centre where library and information services are also offered.

Strengths of this management structure appear to be the relatively unbureaucratic organisational design, the variety of approaches that can be tried out, and the attempt to reach a great number of schools. Another strength is the strong emphasis on the establishment and sustaining of local and regional networks. Much depends on the potentiality for self-organisation of these networks. A danger is that money invested in programme of intermediary organisations may not reach schools and may create a strong dependence of schools on these organisations. The farther away from schools (where the action is supposed to take place) the money is invested, the less efficient it will probably be. On the other hand a certain local and regional infrastructure is undoubtedly necessary to facilitate co-operation, communication, and training.

The Irish school partnerships

The Departments of Education in Ireland and Northern Ireland have created a special infrastructure to support networking between schools across the two parts of Ireland. Schools with similar environmental interests are put in "cluster groups" of four schools, two from each jurisdiction. Twenty-eight schools (six cluster groups) participate in the network. The schools of each cluster agreed to work on the same environmental issues. One cluster group, for example, concentrated on the study of the impact of urban development on water quality of four rivers. The four schools exchange students for field study activities and social interaction. An important aim of this network is to "promote greater understanding between teachers and pupils from different cultural backgrounds within the island of Ireland" and to foster open and tolerant relationships (see Department of Education of Ireland, 1994, p. 9, in the Documentation for the ENSI list).

The network is co-ordinated by a steering committee which is responsible for policy and funding and is composed of representatives from each of the two Departments of Education and from the pedagogical support team. The pedagogical support team provides organisational assistance to schools and documentation, *e.g.* by organising seminars for participating teachers, annual exhibitions of work, and by publishing a newsletter.

An important strength of this network is its extension across sensitive political and cultural boundaries. It is a courageous attempt to increase social stability. Another strength is the idea to link the concern for the environment with the concern for mutual understanding. According to the evaluation report, joint environmental initiatives can provide a basis also for the development of tolerance and mutual trust (*ibid.*, p. 31).

There are, however, also possible dangers which might be considered. Co-operation is not a result of "good will" but will be sustained only if the tasks in which students and teachers involve themselves (in this case environmental school initiatives) demand it. If the schools' projects are "used" instrumentally to promote better understanding between the two parts of Ireland, they may lose their intrinsic value and may become mere alibi activities. Such a development would probably have negative effects also on the socio-political aims of the network. Secondly, care should be taken that the centre of gravity of the network stays with the schools and does not move to the complex administrative infrastructure. If the schools become objects of a network model the cost/effectiveness may be reduced as well as the chance that school-initiated "dynamic" networks emerge.

The Austrian plan of an Environmental Education Academy

The establishment of an Environmental Education Academy is an off-spring of the ENSI project. The basic idea is to effectively use the available human potential in the teaching profession in order to further develop high-level environmental education. Members of the academy are expected to be teachers who involve themselves in environmental projects that generate (local) knowledge and/or to change environmental conditions, document and do research on their own practice, and contribute to teacher development and/or local environmental counselling.

Two types of membership are envisioned. "Normal" members are teachers who are routinely involved in environmental education following the ENSI quality criteria and are reflecting on their work. In addition, there is a special type of membership for a small number of teachers who – for a limited time – accept the task of investing additional time and energy to assist other teachers in starting and evaluating environmental initiatives and who contribute to professional knowledge in environmental education.

The overall plans for an Environmental Education Academy have been accepted by the Ministry of Education and will be implemented in 1994. The control of procedures is intended to be in the hands of elected members of the academy. Organisationally, the academy is linked to the Fund for environmental education established by the Ministry of Education and the Ministry for the Environment, Family and Youth Affairs in 1992, which distributes financial resources to proposals for environmental school initiatives which promise to reach certain standards.

The Environmental Education Academy so far represents the most comprehensive concept for the promotion of environmental education in Austria. Its potential strengths are closeness to the schools and to practical work in environmental education, and considerable flexibility, because it is not anchored in an institution but is an institutionalised network of highly involved people. Each of them remains free to translate his or her interpretation of the quality criteria for environmental education into practice but is expected to reflect on the work and communicate with others. But there are also potential dangers which are in part a result of being a pilot initiative without any precedents. The Environmental Education Academy may become too dependent on government support and lose its impact especially when dealing with controversial issues. Another danger is that the Academy risks a form of elitism and social hierarchy that might make it irrelevant to the enterprises and to the movement it is trying to help (House *et al.*, 1994, p. 22).

The ENSI networks

The ENSI Project is an international link of national networks of schools involved in environmental school initiatives. The national ENSI networks typically consist of teachers of the schools involved, of a national co-ordinator and of one or two educational support persons sometimes assisted by a committee. Generally they are established and financed by a central or regional authority but are outside the hierarchy of educational administration. Internationally they are linked through OECD/CERI.

These national networks take on a variety of tasks including:

- the organisation of national training seminars for the participating teachers and of seminars by project teachers for other interested teachers (such as the INSET model described in Thonhauser *et al.*, 1993, p. 53);

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- the development of policy initiatives in environmental education (to improve support structures, working conditions);
- the publication of case studies, research reports and other forms of material (such as newsletters); and
- the organisation of events, such as conferences, exhibitions and to increase the visibility and accessibility of environmental school initiatives.

A main strength of these networks is their official character legitimated by national authorities and an international organisation. A strength is also its dual function: it serves both the national educational administration by increasing the visibility of environmental education policy, and the participating teachers by offering training (*e.g.* in action-research), opportunities for the exchange of experience, political support for potentially controversial initiatives, international contacts, access to resources and last but not least a context for mutual encouragement and friendship (the "psychological" function).

However, the national ENSI networks face the same problems as any other centrally administered network: to overcome the distance from the project work that is going on in schools and to avoid the imposition of answers to never asked questions (a danger sensitively described in Pozarnik *et al.*, 1993, p. 495). Its usefulness for specific operational activities of the participating teachers is therefore a matter of continuous negotiation. Many activities of the network (the production and publication of case studies, its contribution to INSET activities, to conferences, to materials development, etc.) are not directly related to the school initiatives of the participating teachers. Therefore, the willingness of teachers to participate in such a network depends on their widened perspective with regard to professional responsibility and on the network's capacity to fulfil their demands for support, legitimation and political influence.

Model municipalities for promoting environmental education

In Japan some municipalities are appointed as "model communities" to promote environmental education. "Respecting the uniqueness and culture of the local communities, designated municipalities set up committees comprised of representatives from schools, PTA, social education facilities, business and academic circles and administrative bodies, enforce measures on the basis of the policies and proposals discussed by the committee and encourage case studies in the experimental schools (see Fukuoka and Toshiyuki, 1993, p. 9, in the Japan report)."

A considerable strength of this approach is that a municipal forum is created in which diverse interests can be discussed and in which concerted action can be taken. A possible problem could result from differences in the social influence of the participating groups. If the schools (*e.g.* the students) are the weakest partner and considered as recipients of demands from social groups rather than producers of demands on other social (*e.g.* economic) institutions, their motivation to invest energy may be quite limited. It would be very interesting to get more evaluative details of the effects of this infrastructural model.

A technical infrastructure for dynamic networks: electronic mail systems

A technical means that may facilitate the development of school-mediated networks is provided by electronic mail systems. As yet there are only few examples of this kind of communication in environmental education. One is the Environmental Education and Computer Conference Network (Robottom, 1993, p. 26). It links schools in Australia and in the United States that are involved in chemical analyses of water quality. They share a data bank at the University of Michigan and are also connected with each other. They use the data bank for comparative analyses and the network to exchange experience, to ask each other for advice on methodological problems, to verify interpretations of data and for informal communication.

There are a number of arguments that favour electronic mail communication:

- Quick communication between schools involved in similar projects could stimulate work and could improve its quality. Very successful teachers and students could be relatively easily "accessible" by other interested schools. Critical feedback on their research findings and methods and the emergence of a "scientific community of teachers" could be facilitated.
- Electronic mail would provide the opportunity to create and use data bases. For some types of projects data-sharing could considerably broaden the operational basis.
- It would link schools not only with each other but also with universities and other institutions. This would (at least in theory) considerably extend the sources of information available to the individual school.
- The network could make it easier for groups of (not necessarily neighbouring) schools to develop co-operative projects (this is probably the most attractive long-term argument).

There are, however, also some caveats:

- For some of the uses mentioned above surface mail would suffice. Past experience however shows that it is hardly used. This could also happen to electronic mail, at least when the novelty effect is over. Positive experiences with fax communication are reported from Ireland and Northern Ireland (see the Irish report, 1994, p. 35 in the Documentation from the ENSI list).
- Most projects do not depend on communication between schools. As a result, communication via electronic mail would not answer existing needs but rather open additional dimensions. In view of most of the present environmental projects its value therefore could be rather low.
- The establishment of computer communication may not be in line with an environmental philosophy to save scarce resources.

Nonetheless, electronic mail provides a number of attractive and still untapped opportunities and can (among other things) facilitate the emergence of school-mediated dynamic networks.

Conclusion

It is interesting to note that most approaches to the development of an infrastructure for environmental education have certain features in common:

- the support of process has gained priority over the production and distribution of materials;
- there is a strong bottom-up orientation and top-down initiators tend to interpret their role as facilitators of local initiatives; and
- there is an attempt to debureaucratise infrastructural arrangements by bringing them closer to the schools.

The main challenges for any infrastructural support system are:

- To counteract the quasi-natural tendency to define and to olve problems for the teachers and to tell them what to do, assuming that its problem definitions and solutions are by nature better than those which the teachers and students develop *in situ*. Although this may well be the case sometimes, it is likely to reduce the energy invested and the educational value of the local initiatives. So, in balance, it may have more negative effects than positive ones.
- To invest its know-how and institutional power in the seemingly less respected but in fact more demanding tasks to increase the visibility and accessibility of high quality school initiatives and to create opportunities and stimuli for communication between students, teachers and other social groups affected by school initiatives.

Chapter III

Environmental Education, Action-Research and the Role of the School

by

John Elliott

Action-research and the design of ENSI

Action-research is an integral part of an alternative logic of curriculum development to the more familiar logic of planning by objectives. The use of action-research within the framework of this alternative logic owes much to the English curriculum theorist, Lawrence Stenhouse, who developed a powerful critique of the use of behavioural objectives in curriculum design and counterpoised against it a process model (1975), the potential of which he practically demonstrated through the Humanities Curriculum Project (1968, 1971).

ENSI's design was informed by Stenhouse's process model and challenged teachers in schools to develop curriculum strategies for involving students in a dynamic learning process which focused on concrete environmental problems and issues encountered in their own communities at the local level. This inevitably poses a number of educational issues which are difficult to handle in terms of planning by objectives, for example: handling the controversial and complex value issues which surround human actions towards the environment in an educationally worthwhile way; the role of the disciplines in generating useful local knowledge about concrete environmental problems; the development of dynamic rather than passive qualities in students which enabled them to accept responsibility for their environment and motivated them to search for and develop solutions to complex problems. Such issues concern the nature of the environmental education process rather than the content of the beliefs, skills, and attitudes which result from it.

Stenhouse (1975) saw his process model as open to, and dependent upon, teachers' judgements about what constitutes an educationally appropriate curriculum as opposed to the strict objectives model which seeks to control teachers' inputs into the curriculum. The quality of such judgements will be heavily dependent on the ability of teachers to systematically reflect on their pedagogical practices. Hence the significance of teachers undertaking action-research in the context of developing curricula which support the realisation of educational process values. This way teachers enhance their capacities for making wise and intelligent judgements about the curriculum. From the point of view of the process model, as Stenhouse pointed out, there can be no curriculum development without teacher development. These are not to be seen as different processes but one and the same. In developing the curriculum through action-research in particular learning contexts, teachers also develop themselves within their professional role.

The process model was used as a basis for the design of ENSI and implied that environmental education curricula was not to be constructed in the schools and with and by the teachers. The title of the project "Environment and School Initiatives" makes it clear that schools should accept responsibility for curriculum development in the field of environmental education. An acceptance by participating countries of the principle of curriculum subsidiarity with respect to environmental education was expected. ENSI can be properly regarded as an opportunity for Member countries who had previously exerted centralised control over the school curriculum as a whole, to launch a pilot experiment in the devolution of responsibility for some areas of curriculum decision-making to the school level. One example is the Austrian Ministry's acceptance of a process model design and is clearly consistent with the views expressed by the National Co-ordinator (appointed by the Ministry) and his Head of the Department that "subsidiarity and democratisation" should "be decisive orientations for school development work" (Thonhauser *et al.*, 1993).

The strict objectives model of curriculum development is often attractive to governments who want to develop and maintain a national curriculum by centralising power over curriculum judgements and decisions in the state apparatus. It enables countries to nationally standardise the content of learning. The content signified in the objectives can then be represented in textual form. Both knowledge (knowing that) and skills (knowing how) get represented as information, so that the teacher's role is reduced to that of enabling students to efficiently and economically process information. The teacher is cast in the role of a technician. But even information processing tasks tend to be prescribed in the text, and leave the teacher in the role of an organiser of resources rather than a pedagogue. The strict objectives model enables the curriculum to be developed in the form of "teacher-proof" texts. This limits the teacher's role in the curriculum development process and enhances the power of the state to shape what and how students learn. Teachers eventually become implementors rather than developers of the curriculum.

Whereas the strict objectives model ultimately implies the desirability of developing a teacher-proof curriculum, the process model implies the desirability of school-based curriculum development by teachers since it generates frameworks which support rather than constrain the exercise of their capacities for deliberation and judgement. Curriculum development is viewed as a deliberative and experimental process as a form of (action-research) carried out in classrooms and schools by teachers; a process which enables them not only to continuously modify their repertoire of teaching and learning activities but also their conceptions of the ends to which they are directed and the statements about aims and principles in which they are expressed.

Mayer claims (Chapter II) that the project created a context in schools which enabled teachers to engage in action-research:

> "The ENSI teachers were not given curricula or materials, but a set of values, both educational and environmental, on which to build their own contribution to the project, some more general objectives and the concrete situations – the school initiatives regarding the community – within which they were to be carried out. ENSI created contexts which led teachers to reflect on their own practice and to modify it."

Can the process model be generalised? Ernest House, in his report on policy developments (Chapter IV) expresses scepticism towards the possibility of involving the vast majority of teachers in action-research. Not all teachers can manage action-research he argues. Therefore national policies should encourage action-research but not to the exclusion of other ways of improving teaching. Nevertheless he affirms a belief in action-research as "the highest form of environmental teaching", and points out that "there are excellent examples of action-research in ENSI schools, so we know that such teaching can be accomplished". He claims that other forms of environmental teaching can be successful and that policy should encourage a diversity of approaches, with action-research at the top of the list of possibilities.

Mayer and House appear to represent two rather different views of ENSI. House views the project as one which attracts and involves exceptional groups of teachers, but cannot be disseminated to the mass of the profession. Mayer, on the other hand, seems to view it as a means of establishing contexts which enable all teachers to undertake action-research. The fact that some teachers in ENSI schools are engaged in action-research of a high quality does not necessarily imply that they are specially talented. It may simply imply that the specific project involved conditions that were absent in the working context of the majority of teachers. These include the development of a criterial framework of aims and principles to support reflection about both means and ends, and the provision of opportunities to share and compare experiences, and to articulate and develop common agendas of themes to address. House's view may well reflect the perceptions of those responsible for the implementation of national policies, and Mayer's may reflect the enthusiasm of pedagogical support persons who had discovered the potential of action-research through their experience of working with teachers in ENSI. To what extent do the national reports substantiate or refute the process model as providing contexts which enabled teachers to undertake action-research, and to what extent do they provide evidence of the kind of professional learning process involved in action-research?

ENSI, action-research and professional learning

The Swedish national report refers to the fact that national curriculum policies have, over the past decade and a half, emphasised interdisciplinarity and the role of the school in curriculum decision-making. It outlines a process of increasing decentralisation of power culminating in a new set of curriculum proposals which were published in

June 1993. These proposals included a policy recommendation that "teachers reflect on educational practice for achieving educational aims and values". The Swedish report recalls that this is not dissimilar to the recommendation enshrined in the design of ENSI at the beginning of Phase 1 – namely, that participating teachers should "systematically reflect on their activities in order to improve them and contribute to their own and others' knowledge of environmental project work" (Section 2.3.2). It points out that teachers found it difficult to understand and accept this recommendation, "partly because the idea that teachers could produce data on their own work appeared too novel", and anticipates a similar response to the recommendation contained in the new Swedish curriculum proposals. It argues that the experience of ENSI at Phase 1 demonstrates that systematic reflection on classroom activities is not "normal practice" and "does not just happen" (Axelsson, 1993, Section 3.6).

The Swedish report appears to support the views expressed by House rather than Mayer's. However, it points out that Phase 2 of ENSI embodied the recommendation that teachers be given special pedagogical support for action-research in each participating country. Trainers from two teacher training colleges were appointed in Sweden to provide "a new-start and a letter issued to teachers in the six participating schools, half of which had participated in Phase 1". The letter stressed that:

> "It was no longer enough for the teachers just to participate in the network meetings and listen to information about degrees of influence. The teachers involved were from now on also expected to make classroom observations, accept colleagues and myself as visitors in the classrooms, and share collected data with others (*ibid.*, Section 3.4.5)."

The fourth network meeting held eighteen months after the first appears to have marked a turning point in teachers' outlook. About half of the teachers had collected data from their classrooms prior to the meeting as requested, and in small groups examined its relevance to the aim of developing dynamic qualities in students. They were given the task "of finding out whether dynamic qualities do emerge in the students as a result of the environmental education project work" and concluded that students have little influence over what happens in the classroom and feel that they don't (*ibid.*). Moreover, they were extremely motivated to overcome the problem they had discovered for themselves and "not someone from above":

> "And this is what matters: what you have found out yourself is what you believe in (*ibid.*)."

It was what teachers discovered together and for themselves about the problems of existing practice which motivated their subsequent use of action-research.

> "By the end of this meeting the schools had drawn up plans for their future classroom observation activities (*ibid.*)."

From a top down situation in which the pedagogical support persons had been trying to get the teachers to see the point of action-research, ENSI in Sweden moved over an eighteen-month period into a phase where the teachers discovered the point for themselves. However, the discovery was made in a context where:

i) a criterial framework of aims and principles to support reflection had been established;
ii) data gathering activities were prescribed by the pedagogical support persons;
iii) teachers were given opportunities to share and compare data about each other's practices at "network meetings"; and
iv) data analysis was structured by pedagogical support persons who set tasks requiring groups of teachers to examine each other's data in the light of a criterion in the framework.

It was such elements, built into the ENSI Project at the design stage, which enabled teachers to problematise their practices in forms which motivated them to undertake action-research to improve them. The use of a criterial framework of process aims and values rather than a set of content objectives is not insignificant. A practice, which is shown not to be an effective means of achieving certain pre-specified objectives, will be viewed as technically deficient by practitioners. Such an evaluation identifies a need for teachers to improve their technical skills but does not call into question their professional integrity which lies in their commitment to educational values. Teachers who problematise their practices in the light of process criteria raise issues about their professional integrity and commitment as educators. Their professional identity is destabilised and their practice becomes reflexive rather than simply reflective. Problematising practise, destabilising the "self", and becoming reflexive are all necessary conditions for adopting an action-research approach but the context in which criterial curriculum frameworks are used to realise these qualities of professional learning is significant. Teachers are unlikely to problematise their practices in isolation from each other. It is the experience, so richly documented in the Swedish report, of discovering problems in common – of being in "the same boat" as one's peers – that enables individuals to subsequently research their practices with their peers without feeling intolerably threatened by the enterprise. The Swedish report describes its use of the "Analytic Discourse Method" developed by Altrichter and Posch to help Austrian ENSI teachers report on their action-research to their peers without feeling too threatened. It involves being interviewed by one's peers who operate under strict rules of procedure such as "only ask questions", "don't make critical comments", "don't give advice on solutions". The Swedish report remarks on the quality of professional learning realised through this form of public reporting compared with customary reporting practices in schools:

> "Most important of all: the project teachers became more elaborate on their own project. Compared with a traditional report in which the project teachers have chosen to tell, and are not more knowledgeable after giving their report than before, this way of reporting gave something useful back to reporting teachers (*ibid.*, 1993, Section 3.6.2.)."

The Swedish national report appears to support the view that ENSI established contexts that motivated teachers to undertake action-research as a significant departure from customary practice. It suggests that the conditions which operate in particular curriculum development contexts are more significant predictors of teachers' engagement in action-research than context free judgements about the distribution of certain capabilities in the teaching profession. These conditions relate to the creation of professional learning networks, the setting of data gathering and analysis tasks within the networks, and the construction of useful criterial frameworks for describing worthwhile educational processes. They promote professional learning and change from "the bottom up" and stand in marked contrast to "top-down" approaches to professional development which tend to be text-driven and course-based.

> "If you start in-service training with the bottom-up perspective instead of writing commentary materials to the national curriculum, then the teachers will be able to reflect on what policy and practice will best meet the goals of an environmental education (*ibid.*, Section 4.2.3)."

To what extent do other national reports from ENSI support the evidence from Sweden? By the end of Phase 1 in 1988, the Austrian team of nine teachers – representing 9 schools undertaking ENSI-style environmental projects – were widely acknowledged to be exemplary practitioners of action-research-based curriculum development in the field of environmental education. This was largely on the basis of case studies they wrote concerning their action-research on the pedagogy of project-based and community-focused environmental education. The team had been supported by a national co-ordinator with Peter Posch as their "scientific" advisor. For Phase 2 the team was extended to include teachers from two more schools, and three of the original members were replaced by colleagues from the same schools, due to "too high work loads or change of job" (Thonhauser *et al.*, Section 1.1.2). Two additional scientific advisors joined the support group.

Throughout both phases this nation-wide "network" met 14 times with the co-ordinator and scientific advisors for a "mutual exchange of experience" and "co-operative reflection on one's own professional actions" (*ibid.*, Section 1.1.3). During Phase 1 the co-ordinator and scientific advisor provided additional support to individual team members through visits to project schools for the purposes of discussing "the documentation of the respective projects, the reflection of the experience gained in this context and the evaluation in the form of case studies" (*ibid.*, Section 1.1.3). During Phase 2 additional support to the seminars was provided by a "Further Education" programme to "assist them in further developing" their "dynamic skills" (*ibid.*, Section 1.1.3).

The concept of action-research played a central role in articulating the professional learning context for the development of these skills. An action-research process was seen by the support persons as a necessary context for the development of the innovatory pedagogical skills associated with project teaching in a complex field of study like the environment. Such dynamic teaching skills are, the Austrian report argues, required to realise the kind of project learning specified in the design of ENSI. The "central areas of action of the teacher, the planning, implementation, and assessment of teaching (...) become by far more complex than, for example, for simpler teaching concepts, such as knowledge – or skill-orientated teaching" (*ibid.*, Section 1.2.1). Examples of the dynamic skills teachers need to foster ENSI's process values include:

- competence in organising small group work;
- communicative and advisory competence;

- diagnostic competence;
- co-ordinating and conflict resolving skills; and
- the ability to co-operate with others in learning sites outside the school in the community and with parents.

The report points out the implication that "dynamic qualities" are a precondition as well as an "objective of pedagogical influence" (*ibid.*, Section 1.1.3). Earlier it argues with Posch (1993) that project focused environmental education requires "an enrichment of the culture of learning and teaching" (*ibid.*, Section 1.2.1).

The argument for the view that action-research is necessary and central to the development of such dynamic skills is well put in the Austrian report:

> "That teachers do not so much arrive at their individual professionality by accepting existing theories provided by 'normal science' but rather by using their own 'subjective' theories, developed with individual, critically tested and reflected experience (*ibid.*, Section 1.1.3)."

In other words dynamic and complex pedagogical skills like those listed are not learned by simply applying externally derived pedagogical theories to practice. They can only be learned through a process which involves the reconstruction of the beliefs and assumptions about learning and teaching which underpin customary practice in schools.

The Austrian teachers were introduced through a series of "Further Education Workshops" to a range and variety of action-research methods/techniques for reflexively developing their project teaching skills. These together with the initial school visits and the Network Seminars constituted a form of pedagogical support aimed at enabling the participating teachers to meet the following role requirements:

- implementation of environmentally relevant project teaching according to the aims and principles of the ENSI programme;
- written documentation of teaching processes as a basis for self-analysis and self-assessment;
- drafting action-research reports in the form of case studies; and
- disseminating the findings reported in the case studies through further teacher training activities (*ibid.*, Section 1.2).

The requirements, as the Austrian report points out, heavily stressed the production of written documentation and reports during the course of the action-research. In this respect the Austrian interpretation of action-research differs somewhat from the Swedish interpretation where the stress appears to have been placed on the quality of the verbal as opposed to the written discourse. Such a difference might be partially explained in terms of the greater variety of purposes the action-research process was intended to serve in Austria compared with Sweden, beyond those of directly benefiting the practices of the participating teachers, *e.g.* enabling teachers' research to influence policy decisions at Ministry level, particularly with respect to issues surrounding the development of project teaching in the school curriculum; enabling the further professional learning of teachers to be grounded in the learning of their peers through the use of teachers' research reports in training programmes. Such aims are entirely laudable in their aspiration to give teachers greater control over the production of educational and professional knowledge. But meeting the additional pressure to write which they imposed might have been experienced by Austrian teachers as a burden exceeding the benefits writing brought to the improvement of their practices. The Austrian report frequently remarks on the teachers' experience of the writing requirements as burdensome. But it appears to assume, as indeed do the participating teachers interviewed by its authors, that the additional aims of the action-research are not in conflict with that of directly improving the practices of the teachers concerned. The report documents the burden of documenting data and producing case studies, and suggests that there are strategies for reducing it, but it never seriously questions the value of writing things down, neither do the teachers. The latter appear to accept the burden of writing in a way teachers from some other cultures might not. This is because the stress on writing in the Austrian project can also be partly explained by a cultural tendency to view the written rather than the spoken word as the better medium for enhancing the quality of individuals' reflections. The Austrian report is engaged in the following argument:

> "It can (...) be assumed that teachers and pupils deal with their joint experience more thoroughly by using the fairly slow and laborious method of writing than by using the traditional form of thinking or speaking; writing goes hand in hand with concentration and reflection; the 'translation' of experience, attitudes and wishes into writing can help to clarify, reinforce, deepen, ease or release (Thonhauser *et al.*, 1993, Section 1.2.2)."

When asked about the most problematic aspects of the project the Austrian teachers frequently mentioned "problems with action-research, and here in particular with the corresponding documentations and case studies" (*ibid.*, Section 2.2.4) but called for additional help and support rather than questioned its value. Not only did they cite these "objectivations of teaching/learning processes" as the most novel aspect of their project experience, they also testified to their value in developing the dynamic skills of environmentally relevant project teaching (*ibid.*, Section 2.2.1).

The Austrian report illustrates the ways in which ENSI established a context of pedagogical support which enabled participating teachers to not only constructively engage in action-research themselves, in spite of the burdensome demands it imposed, but also to disseminate it as an approach to other teachers through their involvement in further teacher training. Of course, one might argue that the 14 or so Austrian teachers involved over the 7 years of ENSI constituted an elite group whose members already substantially possessed the special and rare capabilities for reflective analysis demanded from action-research. The report makes it clear that the teachers were not selected primarily with these capabilities in mind. Rather they were selected for their commitment to, and experience of project teaching in, the field of environmental education (*ibid.*, Section 1.1.2). Although such "innovators" may already have possessed capabilities for reflection and analysis, their testimony, documented in the Austrian report, does not suggest they had been extensively developed prior to the project. The report provides no evidence that action-research is not accessible to the majority of teachers given the presence of certain contextual factors.

Both the Swedish and Austrian reports show how ENSI enabled teachers to problematise and change their practices by reflectively recovering and reconstructing the theories which underpinned them. According to Mayer this was the major impact of ENSI on teachers in many participating countries. She argues in the final Synthesis Report that:

> "If the ENSI project was something different, if we can say it was successful, it is not because it has introduced elements of environmental education into school curricula of over 200 schools, but because it showed how it is possible to modify the implicit images teachers have."

The question remains whether not all teachers can manage action-research and that alternative options have to be open to them (see House, Chapter IV in this volume). From the evidence cited teachers cannot manage action-research when they prove they are incapable of pedagogical change. Of course, House might have confused action-research as a pedagogical process characterised by certain aims and values with its concrete expressions in particular data gathering and processing methods. In which case, it constitutes one of many possible forms of reflective practice. However, action-research should not be understood as a particular set of reflective procedures, but as an action-orientated and self-reflexive inquiry whose realisation can take many forms in different cultural and social contexts, as a comparison of action-research approaches deployed in ENSI from one country to another might demonstrate. This section already alluded to a possible difference of emphasis between Austria and Sweden.

Positive evaluations of the potential of action-research strategies to effect significant curriculum and teacher development at the school level can be found in many other national reports, especially those of Australia, Denmark, Italy, Scotland and Slovenia. What all these countries had in common was organised and well-informed pedagogical support for teachers to engage in action-research and a curriculum and policy context which was consistent with the use of ENSI's process-oriented curriculum framework to generate questions to guide data gathering, analysis, and decision-making. They provided little evidence that regardless of these conditions many teachers were simply incapable of effecting professional change in themselves through a process of action-research. Further evidence cited below from the Danish and Scottish reports supports these general conclusions, before concluding with a discussion of the more ambiguous views expressed in the Italian Report.

Only two schools participated in ENSI in Denmark due to lack of government funding for the provision of pedagogical support. The two schools involved had already participated in government sponsored development work at school level, which had been evaluated by the national co-ordinator appointed by the Ministry on the understanding that participating ENSI schools would fund the support he provided. These two schools managed to secure local funding for the support of action-research, which had not been a requirement of the government sponsored development work. The group of 4 teachers met with the co-ordinator before the teaching projects began in two one-day seminars which focused on the aims of ENSI and the theory and practice of action-research. During the teaching projects they met twice to share experiences and afterwards three days were spent on discussing the treatment of the data gathered by the teachers and the writing up of case studies of the projects, a process which went through several editions (Christensen, 1993, p. 14). A substantial part of the Danish National Report consists of two highly readable and insightful case studies of the problems of environmental project teaching. The report concludes that whereas there is little evidence that conventional in-service courses and school development programmes have resulted in significant pedagogical change, participation in systematic action-research "seems to be an effective way of inducing changes in practice" (*ibid.*, p. 54). It stresses the significance of systematic reflection as opposed to a more informal and unstructured process:

> "It is a normal part of teachers' work to make decisions and reflect on the outcomes, but it is important to deal with this process in a systematic way as it was done in the two ENSI projects."

Such a judgement of the value of action-research should carry a great deal of weight, given that it comes from someone who had not only co-ordinated ENSI but also evaluated a number of non-action-research based curriculum development activities in schools in the field of environmental education.

Scotland's national report also demonstrates the potential of teachers' action-research given certain enabling conditions. The Scottish Education Department funded a pedagogical support person to work in close liaison with an inspector appointed as the national co-ordinator. The pedagogical support person appears to have represented action-research as the basis for a comprehensive and democratic evaluation process in which evidence is gathered, reflected upon, and reported by all the major stakeholders in the curriculum development enterprise at the school level; teachers and students were asked to document and report their self-evaluations of teaching and learning, and the views of headteachers, school board members, and parents elicited in interviews or through written self-reports.

> "Schools (teachers and pupils) were encouraged to keep a record of their activity. This resulted in a bank of material evidence being assembled – pupils' work (...), the record of detailed investigations over time, (...) photographs and video tapes, etc. Teachers were also encouraged to keep a log, personal diary, or notes to record less measurable or ephemeral happenings, perhaps the outcomes of casual discussion groups and other less formal teacher/pupil exchanges' (McAndrew and Pascoe, Section 3.4)."

Reports from each school were prepared in consultation with the Project Officer (Pedagogical Support) and, by December 1992, a "large quantity of material emerged" to serve, as in Austria, a variety of purposes. These are listed in Scotland's national report as follows:

- "they are important papers for teaching and management staff in the schools themselves as part of the evolving discussions to inform decision-making on environmental education provision in the curriculum in their own schools;
- they provide, for this national report to the OECD, a range of evidence from primary and secondary schools working on their own selected projects, on a number of issues in the implementation of environmental education initiatives;
- education authorities, colleges of education and non-governmental organisations (...) will be given access to the full ENSI Project-generated material which

> will be offered as support for the implementation of the 5-14 Programme and other relevant national and local initiatives. The participating schools' experiences and their reports are persuasive in promoting wider-scale activity based on the ENSI principles in action; and
>
> – a selection, published as an Annex to this national report, provide more in-depth case study source material (*ibid.*, p. 4)."

In Scotland the Project Officer appears to have integrated pedagogical support for teachers' action-research into an evaluation process which is formative for both practice and policy. At the same time the process provided a form of accountability and quality control acceptable to the schools because it consisted of self-evaluations, which were in turn acceptable to policy makers because they were externally audited by the Project Officer. Generally the latter played the role of the co-ordinator of an evaluation process which supports school-based development both directly and more indirectly by demonstrating its value and potential to policy-makers and the general public. It is in the context of an established tradition of school-based curriculum development under threat from top-down policies and accountability mechanisms emanating from England that one needs to understand the form of action-research which emerged from ENSI in Scotland and the extent of teachers' participation in it. But, as in Sweden and Austria, it was the process orientation of ENSI's criterial curriculum framework which provided a stimulus for systematic data gathering and analysis.

> "The process of examining ENSI principles, transferring and applying these to individual school situations, planning and executing innovative projects with pupils and involving members of the community provided a challenging agenda (Section 6.3)."

Like some other national reports the Scottish Report testifies to the extent to which teachers were enabled to problematise their practices through ENSI and entertain new possibilities for action:

> "The ENSI Project contributed to the professional development of participating teachers in a number of ways (...). Firstly, the schools were asked to carry out a process of review. This reflective exercise resulted in teachers questioning current practice both content and methodology. Presentation of the ENSI principles at school inservice meetings inevitably led to interesting and meaningful debate (McAndrew and Pascoe, Section 6.3)."

However, the Italian National Report expresses some ambiguity on this issue which is particularly worth exploring in the light of the optimism Mayer expresses in the Synthesis report. She is the co-author with Losito of the Italian Report. The latter devotes a whole section to the use of action-research by 12 Italian teachers in 9 schools during Phase 2 of ENSI, and comments on the inexperience of both teachers and the pedagogical support persons (Losito and Mayer, 1993):

> "Even though some of the teachers already had diverse kinds of experience in research (...) nobody had ever undertaken action-research. Many did not even have the faintest idea of what it was (...). The two and a half years we have spent on this phase of the ENSI project have therefore been two years of preparatory training for

> action-research, both from the teachers' work and facilitator's work standpoints. Two and a half years of common themes and trial and error with which we tried to come to terms with action-research, each person ready to face the risks that it entailed (...). There were difficult moments, fatigue, and even conflict. However, they certainly proved to be years of collective growth, increased competence and development of a group that in some peak moments acted very much as a research team. At the end of this period we found new awareness, but also certain problems still to be solved regarding action-research – or, at least, our way of doing action-research. To be honest, we are not really sure that we all did action-research at all (Section B, Introduction)."

The report echoes the Austrian experience that action-research require the development of competencies which are not associated with more traditional forms of quantitative research:

> "Carrying out action-research and conducting action-research groups require a fair amount of competence in conducting groups and in communicative skills. Our awareness of this aspect has also grown during the project and we think we can consider it as fundamental for teachers and researchers wishing to undertake action-research (Losito and Mayer, Section B, 1.1)."

It also echoes the Scottish Report in describing a pedagogical support process which fuses and integrates teachers' action-research into a democratic evaluation process (MacDonald, 1976) orchestrated by the external facilitators.

> "The presence of a facilitator as evaluator contributed to easing situations of impasse or conflict between teachers and students and within the teachers' groups itself. In this way there was a mutual 'shift' between roles of facilitator and outside evaluator.
> For us, 'external evaluation' meant gathering first-hand information and then drawing the teachers' attention to it so that they could have a better understanding of the situation. We feel that it is worth studying this aspect further, with the reflection on the relationship between outside researcher and teacher-researcher' (Losito and Mayer, 1993, Section B, 1.2)."

The ENSI project required pedagogical support persons to be both project evaluators in their countries and action-research facilitators. Assisted, no doubt, by the Cromer (United Kingdom) conference on "democratic" approaches to evaluation. The Scottish and Italian support persons achieved a creative synthesis between policy-orientated evaluation and practically-orientated action-research. The evaluators, by sharing their data with teachers supported action-research, and the teachers, by submitting their data to the evaluators, contributed to reports aimed at informing policy.

The Italian Report eloquently cites evidence of the positive impact action-research made on the teacher research team in the 39 schools. But some frustration is expressed concerning the lack of dissemination of action-research in the schools as a basis for curriculum and teacher development beyond the original ENSI project members.

> "One widespread difficulty was that of involving other teachers in the research. In many situations the research work was carried out by one or two teachers (...). In

> other cases it was conducted in the same school, but who belonged to different school years. While it is true that in certain cases (...) the development of the work involved more teachers at time went on (...), in most cases action-research was carried out by teachers who referred to the ENSI project. What are the possible interpretations of this situation and the possible consequences? (*ibid.*, Section B, 3.1.1)."

The report suggests one view – that is not dissimilar from the one expressed by House, namely:

> "It is possible that only teachers who have already developed a high level of professional awareness may be willing to undertake this. As a teacher put it, 'action-research is an excellent method for teachers already involved in research', but – as is implicit – is not for everyone (*ibid.*)."

Having entertained this view the report goes on to suggest other interpretations which link the use of action-research to the organisational culture of schools. Its account of this culture is echoed in all the other reports which discuss the implementation of action-research in schools at any length.

> "Perhaps the involving of other teachers in action-research needs more time, 'visible' achievements, institutional recognition. Considering the present state of our schools it is perhaps too much to expect a large number of teachers to be willing to undertake action-research without the adequate recognition (*ibid.*)."

In those countries where action-research emerged as a key dimension of school-based curriculum development, it did so in spite of the school context. The enabling conditions were imposed on this context through the curriculum and pedagogical support frameworks of the ENSI project. Action-research was therefore contained within ENSI, and was not generally institutionalised beyond its operations in the schools. This would not only involve the establishment of pedagogical support structures for action-research within the school organisation but also the development of process-oriented curriculum frameworks. Such frameworks shift the focus of teachers' attention away from content objectives towards a consideration of educational process. Without the support of the ENSI framework it is small wonder that teachers operating in other more subject specific curriculum areas did not catch "the spirit of action-research". I will let the words of an Italian teacher provide the final testimony for the argument that action-research as an approach to curriculum and teacher development is open to the majority of teachers, given certain enabling conditions in the curriculum and institutional contexts of teachers' work:

> "Certainly, the action-research method has changed my way of working. Let me say first that I have shifted my attention more on the process than on the results. Obviously, I still look at certain teaching objectives, but in a different way (*ibid.*, Section B, 5)."

Summary remarks

The ENSI project specified curriculum and pedagogical support frameworks to enable teachers to effect fundamental change in their pedagogical practices through action-research. When these frameworks were implemented during the course of th programme, contexts were established which enabled teachers to problematise the practices in the field of environmental education and to reflexively reconstruct them. Th professional development potential of action-research is only manifested when certain enabling conditions have been established in the curriculum and work context of teachers in schools. In countries where the curriculum and pedagogical support frameworks wer not implemented, action-research did not emerge.

Chapter IV

Environmental Education Policies: In-Depth Studies in Five Countries

by

Ernest House

This chapter is an analysis of government policies regarding environmental education and is based primarily on five in-depth studies of environmental education policies conducted in Australia, Austria, Finland, Germany, and Norway, and also on the national reports from participating countries. These in-depth studies and national reports are rich sources of information that this analysis does not begin to capture. Each country has its own unique set of issues, problems, and dynamics.

This analysis is an attempt to construct a composite portrait of environmental education policies across all countries, including a picture of how the policy process works in general and what effects the policies have. No aspect of this analysis holds for every country, and no country exemplifies all features characteristic of the general policy dynamics. So the analysis applies to most of the countries most of the time, but not to any country all the time. It begins by presenting the social framework from which environmental education policies emerge, delineates typical government policies and their effects, highlights some value issues and the role of higher education, discusses the relationship of environmental education to economic development, and concludes by examining the long-term prospects of environmental education.

Dynamics of environmental education policies

Environmental education policies are most advanced in countries in which the environment appears threatened to the people who live there. Either the environment is seen as naturally fragile, as in the ecosystems of the far North, or else there are imminent dangers, like nuclear reactors, or acid rain, or exploitative farming practices. For example, environmentalism was given a boost in Austria when citizens passed a referendum to stop the construction of a nuclear power plant, an action which inspired further environmental efforts. And in Finland concern about the environment seems to be deeply rooted in the culture itself, but this is not necessarily true for other countries.

Often the national or regional economy is heavily dependent on industries that require a healthy environment, such as outdoor tourism. The population sees environmental threats as tangible, concrete, and threatening to them or their children. Swedes, Norwegians, and Finns, for example, are keenly aware of the nuclear dangers that lurk across nearby borders. Public awareness and concern seem to be necessary preconditions for environmental progress. So in the countries making the most progress there are strong grassroots concerns that encourage environmental education. In countries where there are not such conditions, environmental issues are regarded as less important than other issues.

However, public concerns do not always translate into educational policies. In Switzerland, non-governmental organisations like the Swiss League for Nature Conservation have been active for many decades, resulting in government legislation on water pollution and forest regulation. Swiss teachers in the 1970s and 1980s promoted environmental education, especially in the German-speaking cantons. Yet, in spite of much public discussion of such problems in Switzerland, the government has never strongly supported environmental education activities and only a few cantons have environmental education services or centres. There is no institution at the federal level in Switzerland which co-ordinates and supports environmental education activities, in spite of long-standing Swiss concerns.

In most countries the public is more anxious about the environment than is the government. Passage of the North American Free Trade Agreement was delayed because non-governmental environmental groups in the United States, Canada, and Mexico were concerned about the environmental hazards resulting from such an agreement. The three governments were compelled to make further environmental stipulations because of the actions of citizen groups.

For the most part, government agencies do not initiate environmental actions on their own, but rather respond to expressed public concerns. Nor, in fact, do other societal institutions – not the church nor the universities nor the corporations – initiate environmental actions in general. Rather, such initiatives come from activist citizens and grassroots organisations, usually voluntary organisations that have been mobilised around environmental issues. So environmentalism and environmental education are fundamentally grassroots social movements or derived from grassroots activity.

One might contrast this situation with the highly organised concern for economic development. Concern for the national economy is institutionalised in many organisations throughout each society – in corporations, banks, ministries, parliaments, and universities – and these national institutions are supported by international institutions also devoted to economic development, such as the OECD or the World Bank. Similar institutional structures exist for defence, education, medicine, and even athletics. But only recently have most countries created agencies for protection of the environment, and these agencies are still marginal in influence.

Of course, influence is a matter of degree, and countries differ as to how institutionalised environmental interests are. In general, the Nordic and German speaking countries seem to have institutionalised environmental interests more than other countries. And environmentalism has been an issue in the Dutch parliament since the early 1980s. Most countries have ministries of the environment and offices for environmental education, but these are not central to government operations. Often the ministries and offices are of secondary importance, consulted only on specialised issues. In no country are environmental interests as deeply institutionalised and influential as economic or military interests.

The lack of strong established social institutions to advance environmental concerns results in particular policy dynamics. Since environmental activists constitute grassroots social movements lacking guaranteed institutional support, they must constantly educate, persuade, and mobilise the general public to rally to their causes. Governments respond to expressions of such public concern and the stronger the expressed concern the stronger the government response typically. Of course, governments have many other problems with which they struggle, so they respond with actions (rather than words) when environmental concerns are brought to their attention in a persuasive and forceful manner.

Consequently, the mass media play a particularly important role in the entire policy formation process. The media are necessary for environmental activists to communicate with the public and to express concerns to governments in such a way that their demands cannot be ignored easily. Resulting government policies reflect a balance among competing concerns and established interests. In a few cases, where governments have institutionalised environmental interests, they initiate actions on their own rather than respond to immediate pressures. For the most part, however, environmental interests have not been deeply institutionalised. One goal of environmental educators should be to institutionalise such concerns in government structures where possible (of course, institutionalisation presents dangers of co-optation).

It is important to realise also that environmental education has existed in some countries for considerably longer than the ENSI project. In fact, the history of environmental education does not reflect continuous straight line development. Scotland, for example, has had an environmental education interest going back to the 1970s, but the development was interrupted by strong external events, especially the reduction of 37 local educational authorities to 12. The trauma of this reorganisation and other events forced environmental education into the background for a considerable time. Similar histories can be constructed for other countries. So it is important to remember that each country has a particular history and previous development, even while current common elements are discussed.

In summary, the environmental policy dynamic which operates in most countries is that of a grassroots social movement informing and organising the public, mostly through the mass media, with governments responding to expressed public concerns to varying degrees. Governments respond more in countries where the environment is perceived as fragile, where there is a strong environmental movement, and less so elsewhere. These grassroots movements themselves are highly decentralised both within and across countries. In most countries the public is more concerned about the environment than is the government, so the policy development is one of slow gradual progress, spurred on unexpectedly from time to time by sudden dramatic events, such as meltdowns of nuclear reactors or dangerous refuse on the beaches. Also, development can be diverted by unexpected outside events, such as an energy crisis or governmental re-organisation.

Government policies

Which environmental education policies have resulted from these dynamics? In general, governments have enacted voluntary and permissive policies, rather than mandatory ones. For example, environmental education policies may be manifested as curriculum principles to which teachers and schools may (or may not) devote time, or the ministry may develop guidelines and curriculum materials for use in schools, or the government may support special environmental centres and research projects which co-operate with the schools. In Austria, for example, part of the school curriculum is given over to a dozen or so "principles", one of which is environmental education. Regional and local education agencies are given freedom and authority to devote as much effort as they want to the topic within the allotted time and space (about 20 per cent or the curriculum).

In most countries many diverse groups have developed a range of curriculum materials of varying quality. These materials are distributed by the groups themselves ordinarily, and often the materials are not used in schools. Business groups, environmental groups, government research and development centres, and other organisations develop materials from their own points of view. In the Netherlands this diversity is made a virtue with the schools encouraged to purchase materials from competing sources. For the most part, materials are not evaluated in any systematic way in most countries, although in Austria the government provides for reviews of materials. The collection of data is one tool in the central programme aimed at supporting teachers and schools in their development tasks.

In some countries, like Australia, "lighthouse schools" demonstrate new teaching methods and curriculum materials to teachers and administrators. In other places local schools are given grants by the government to develop their own projects. In a few more directive educational systems, such as some German *Länder*, there is a written curriculum guide which teachers must follow and there are visits from inspectors to ensure compliance. In a few *Länder* environmental education policy takes the form of specific directives as to what teachers should do, with not much interaction among teachers themselves. In Norway, national research projects enlist secondary students as data-collectors, so that a secondary school may monitor water quality in a lake over a period of time and report this information to a university, which then analyses data from many sources.

Environmental education seems to flourish better in countries where responsibility is assigned to education ministries, rather than to environmental ministries. For example, in the United States, the Environmental Protection Agency has been given authority for environmental education rather than the Department of Education, and so far at least national governmental efforts have been weak. Environmental ministries do not seem to have sufficient understanding of educational structures and do not give education the highest priority. No doubt they have other more pressing concerns. Co-operation between environmental and educational ministries is not always good either. In the Netherlands no less than six ministries have been involved in environmental education development, and it took three years to find an acceptable decision framework for their co-operation. Typically, ministries in most countries pursue their own independent policies.

Most Ministries of Education have at most one person, often part-time, to oversee environmental education. On the other hand, the Lower Saxony ministry (in Germany where education is primarily an individual *Länder* function) has two and one-half people devoted to environmental education. And most of the 1 000 hours of released time that teachers have for preparation for innovation is devoted to environmental education, although this teacher preparation time is under assault because of poor economic conditions. Lower Saxony has also formed "multiplier" teams of experienced teachers and consultants who hold workshops and work with teachers to promote environmental education, among other tasks.

Overall, one might characterise environmental education policies as voluntary efforts to persuade teachers what to do, mostly through dissemination of information. If the goals of environmental education are "transmission, transaction, and transformation" (in the words of the Swedish national report), then most policies are at the transmission stage. Their focus is dissemination of information to teachers. The effect of such policies is what one might expect: limited, sporadic development, with pockets of outstanding environmental teaching in a few places, perfunctory teaching in other schools, and not much going on in most places – in other words a modestly successful beginning. Research indicates that dissemination of information alone will not transform education to any significant degree (Odden, 1991). Although it is the belief of educational reformers that their message is so urgent that all teachers will leap into action, such mass conversions rarely occur. (So much laborious follow-up work is necessary to secure deep-seated educational change among teachers.)

In many countries policies to decentralise educational governance impede stronger actions by central ministries. Norway for example, decentralises the running of schools and creates new evaluation plans to manage the system. In general, ministries are reluctant to mandate new subjects from the centre since the trend is towards devolution of responsibility to lower levels. And environmental education, being perceived as marginal, is an easy subject for which to pass responsibility to the lower levels. Uncertainty seems to surround these decentralisation efforts in many countries as old authority relationships change and new ones emerge. Often teachers and school leaders do not know where to look for advice.

In several countries the educational systems are already so decentralised that one must speak of quite different educational systems within the country. Policies among the German *Länder* are quite different one from the other, and the same can be said of the Australian states, which have distinct cultures. The federal ministries in these countries can encourage and fund some activities but in reality extensive substantive action lies at the state or local level. Hence, the in-depth studies of Germany and Australia emphasise differences more than common policies.

In Bavaria, for example, teacher directives have been issued from the ministry, while Lower Saxony has issued only recommendations, although also requiring a report on

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activities. Baden-Wurttemberg has an environmental centre in which teachers and students can stay for weeks. Australia is pursuing a deliberate policy of devolution in which efforts are being made to replace large government bureaucracies with smaller units. At the same time a national curriculum document, which includes "studies of society and the environment" as one of eight parts, provides "suggested" direction on which agreement was reached by the state authorities.

Similar devolution of authority exists in other countries as well. Spain is divided into 17 "autonomous communities", extremely important components of Spanish politics and governance. When the central ministry in Madrid chose schools to participate in ENSI, it asked the autonomous communities and provincial offices to select the schools rather than taking volunteers or choosing schools centrally. After schools were chosen according to regional decisions, they were contacted and oriented to the project. Some had previous environmental education experience, some did not. Similarly, Portugal chose its key demonstration projects from each of five educational regions of the country. So development and implementation of environmental education is affected very much by significant differences within countries as well as among the countries.

Another important factor in environmental education development is that economic recessions have resulted in cut-backs in educational spending almost everywhere, making it difficult to obtain funds for new initiatives. In Finland the central ministry staff was being drastically reduced in numbers. There was little money for any new innovations or initiatives. Australia is suffering high employment and the effects of a severe recession. Widespread economic hardship makes launching new initiatives particularly difficult. Also, there is surprisingly little support for environmental education from teacher unions or professional associations evidenced in any of the countries, a trend again exemplified by Finland. Nor do parents appear to be a strong influence in most countries, although many local programmes rely on involvement of parents.

The governments must contend with many vested interests and they balance these competing and conflicting interests as best they can. Economic interests in particular have high priority in all governments. Indeed, no government in democratic capitalist countries can long survive unless the public perceives its economic welfare as being advanced. Not surprisingly, economic interests often oppose environmental actions because such actions sometimes threaten economic growth.

Probably most progress has been made in those cases where economic and environmental interests work together or reinforce each other. For example, there are regions in Austria where organic farming is promoted as environmentally necessary to reduce heavy fertiliser pollution and also taught in agricultural schools as a way for farmers to compete in a specialty niche in the European agricultural market, an economic as well as environmental necessity. Younger farmers in particular are enthusiastic about this new orientation and attentive to the organic teachings of the agricultural school.

Another trend is for governments to rely more heavily on market policies, which have progressed farther than one might imagine in England and the Netherlands. With such policies the government deliberately puts schools and other organisations into market situations by creating quasi-markets. For example, in England a portion of university teacher education money is given to local schools, and the schools may or may not purchase teacher education services from the universities, thus making teacher educators the ''sellers'' and the schools the ''buyers'' of teacher training. In the Netherlands educational support agencies bid on supplying environmental services to schools, which the individual schools may or may not purchase. Both private firms and public organisations are encouraged to compete. Non-governmental organisations are particularly prominent in these operations. Market policies are likely to increase substantially in other countries as well in the near future.

Effects on schools

Given the voluntary policies implemented by most governments, one might expect that classrooms will vary dramatically in environmental education. And this is true in all countries. There are classrooms in which environmental education is brilliantly taught and others in which environmental issues are taught in as dull a fashion as any other subject. And there are many classrooms in which environmental issues are never a serious topic at all. There is an uneven, sporadic quality to environmental education in all countries.

Although classrooms are the subject of other chapters, this chapter also has a few words about the relationship between policies and classrooms. If environmental education is to be high quality it must be manifested in the classroom itself. Government edicts and international conferences mean little unless they are ultimately translated into teacher action. The only way in which one can judge successful policies ultimately is whether they promote high quality teaching in the classroom. The best way to promote high quality teaching is through teacher development, and the way to promote teacher development is through building intermediate organisations which can support teachers and influence the government and public.

In general, the most successful results have been obtained where policies encourage, promote, and sustain networks of teachers, schools, and supporting organisations. The reason is that these co-operative networks can initiate activities and accomplish things that governments themselves cannot, since governments are conflicted internally by competing concerns and interests. Government policies are often two steps forward and one back, from an environmental point of view. Of course, these co-operative networks require resources, including time, funding, and personal commitment.

Italy, in particular, has an elaborate network of teachers and schools who are classroom focused, and the problems of developing this network are detailed in the national report. Environmental education in Italy has been left to the initiative of individual teachers and local agencies, and the biggest problems are how to initiate innovative activities within the schools, especially the secondary schools, where teachers are more rigid and less inclined to venture beyond traditional subject matter boundaries. The Italian Ministry has remained detached from these events and unconvinced of the importance of environmental education for the most part. But much progress has been made through this voluntary networking of schools at the grassroots level.

Networking means quite different things in different countries. Scotland too seems to be heavily school- and teacher-oriented in its efforts. It has developed a network of schools and teachers but receives more enthusiastic endorsement and encouragement from the government than in Italy apparently. The United States has a network of environmental education display centres in the Tennessee Valley linked through computers to other parts of the world, but not closely tied to either federal or state governments. In France apparently there is a network of government offices whose activities seem to be centrally controlled from government ministries.

One of the most unusual networking projects is in Ireland and Northern Ireland. A previous networking project between 1977 and 1988 provided the foundation for the current ENSI network, which started in 1988. In fact, networking is the key strategy of development adopted. Pilot schools worked together to support each other as they sought to replace rigid control from the centre. Again teachers and schools are primary. An unusual twist was added by teaming schools from the North with those from the South so that cross border co-operation was an integral part. Of course, bridging two different educational systems with different regulations and examinations has been complicated. What the Irish network has been able to do, however, is to involve the central departments of education themselves, even while starting from a grassroots enterprise and focusing on teacher development.

As many of these successful networks indicate, the best way to improve teaching is through intensive teacher development, with heavy involvement of teachers in the development processes. Information dissemination strategies are not sufficient to develop excellent teaching. Lighthouse strategies, valuable though they may be, are not enough to institutionalise environmental education in the schools either. As one Australian teacher said, "We need programs rather than policies", which basically means that teachers need concrete assistance. Institutionalisation of environmental education requires intensive face-to-face involvement in schools and classrooms (Odden, 1991).

On the other hand, lack of clear articulated policy support, as in Switzerland, means that environmental education has been isolated from the evolution of the school itself. There is lack of national co-ordination and influence, and unless school heads are positively engaged environmental education will remain a marginal subject. Parents there have been reluctant to endorse either environmental education or interdisciplinary studies for fear that they might produce bad examination results for their children. Nor is environmental education included in teacher training, though continuing education courses are available. Teachers feel they must teach environmental education collaboratively to overcome these built-in resistances. So the difficulty in penetrating the policy structures at the national level is also reflected at the school level in Switzerland. For the success of long-term development, one must secure the support of the government.

Schools and teachers also face an overload of innovations that compete with environmental education. To deal with innovation overload Hesse, in Germany, has decided to prescribe only 60 per cent of the contents of the curriculum since the ministry found that schools simply left out many parts of the overly prescribed curriculum. Some German teachers, in particular, think that they must always seek permission to deviate from guidelines, and authorities have encouraged them to interact more with other teachers both within and outside school, a different orientation than that of a civil servant. In general, teachers have not yet exercised the initiative newly available to them in some *Länder*. The German in-depth study also highlights the key influential position of school leaders in German schools, who must encourage the teachers to try new things.

Action-research is the highest form of environmental teaching, when properly done. However, other forms of environmental teaching can be successful as well, and not all teachers can manage action-research. So, as a policy matter, it is important to encourage a range of classroom activities in environmental education, with action-research at the top of the list of possibilities. There are excellent examples of action-research in ENSI schools, so it is demonstrated that such teaching can be accomplished. The policy problem is how to encourage its development in many other classrooms as well.

In some countries, examinations are increasingly important as governments try to manage education by controlling "outcomes". A common strategy is to establish examinations and align the curriculum with them. In the Netherlands, examinations and textbook authors are the major influence on the curriculum at the secondary level. However, examinations are not the best way to promote excellent teaching, but many politicians and bureaucrats believe otherwise. Where teaching is driven by examinations it is necessary that environmental education receive space on the exams. Of course, school-based assessment is more consistent with ENSI philosophy. In general, there is a lack of evaluation of environmental education everywhere. For example, the two overriding problems identified in the Norwegian report were teacher development and lack of evaluative information, especially lack of feedback from teachers about how environmental education implementation could be improved.

Value issues

Although ENSI has provided a common conceptual base from which to develop environmental education, there are several conceptual and value questions worth notice. First, it is important to realise that there are significant cultural differences. In some countries, especially German language countries, there is a wide tolerance for students engaging in controversial activities, such as students studying water pollution in the community and challenging local authorities. On the other hand, such tolerance for diverse opinion is not always apparent for teachers and others outside the school. In other countries, especially English language countries, there is much less tolerance for students or teachers acting as activists within the schools. In those countries teachers are expected to assume a neutral role in the classroom, discussing both sides of controversial issues rather than advocating one point of view (Elliott, 1993). For teachers to advocate a particular position on controversial issues is considered "undue influence" over students. Obviously, action-research will take different forms in these countries.

For some countries environmental education is associated with nature study and holistic learning. This is especially true in the German *Länder* where holistic learning means perception with all senses, and that "head-knowledge" be connected to "heart-knowledge" and "hand-knowledge" if behaviour itself is to be changed. Sometimes also love of nature is associated with love of the homeland and even nationalism. It is however preferable to make environmental education an international rather than national concern. The causes of environmental problems are international and cannot be solved by one country alone. Furthermore, environmental educators can succeed in the long run only if they co-operate with people from other countries. Both local and international groups offer leverage against forces that oppose environmental activities at the national level.

In some countries, such as Finland, environmental education is seen as a valuable basis for further moral education. The Danish national report contains a fascinating description of students discussing the keeping of farm animals, with environmental concerns leading to a discussion of animal rights. The Danes also involve students in evaluating the environmental education programme itself, a somewhat unusual move. Students also have been involved in evaluation activities in some projects in Austria, where elaborate student and project evaluation procedures have been employed.

Finally, there is the issue of interdisciplinary effort. A serious deficiency in environmental education everywhere is the lack of integration of economics, politics, sociology and other social sciences in understanding environmental issues. And this deficiency is apparent at all levels. Although one finds classroom discussions of the biological effects of nuclear energy production or chemical farming or waste disposal, one rarely finds an enlightened discussion about the economics or politics of why such production exists. It is not enough to understand the physical forces – one must also understand the social forces that make such things happen.

Environmental education is usually taught in one or a few subject areas, such as biology. But it is difficult to see how a purely biological analysis of such complex social problems can succeed intellectually. Other natural sciences must be involved, as well as economics and political science. However, such integration of subject matter appears easier to advocate than to do. When an integrated experimental science curriculum was introduced in the Netherlands, for example, few schools adopted it.

Where there have been efforts to combine subjects, the result is usually multidisciplinary rather than interdisciplinary. In Bavaria, for example, guidelines assign environmental education themes to collections of school subjects, each of which must deal with the themes within the subject. In Finland, teachers found the curriculum regulations in the secondary schools made subject integration difficult and hindered project work in general. So there is an enormous amount of intellectual groundwork yet to be done before interdisciplinary study and teaching can be achieved, even within the natural sciences.

The role of higher education

Part of the problem resides with higher education. The universities have been fairly autonomous in developing knowledge and research since the early nineteenth century. The first research university, the University of Berlin, was established in 1810 by Baron von Humboldt as a free speech community which would not be subject unduly to outside political and social pressures (Bertilsson, 1991). Since then research universities have been enormously successful in countries where this separation of knowledge production and politics has occurred but the negative side is that universities are very slow to address social problems, especially those that do not fit disciplinary structures.

Environmental issues are regarded rightfully as interdisciplinary or multi-disciplinary, but interdisciplinary programmes are difficult to develop within higher education structures. So environmental education finds itself part of biology or chemistry, and not sufficiently inclusive of other disciplines. Consequently, interdisciplinary environmental education is without strong disciplinary sponsorship in the universities. This weak structural position means that relevant research is not being conducted on environmental issues to a sufficient degree and also that teachers are not trained well because either the information does not exist or is not organised properly. In many countries, such as Denmark or Switzerland, environmental education is not included in teacher training at all.

This higher education deficiency gives rise to another serious problem. The subjects in the lower schools, especially the secondary schools, are legitimised by the disciplinary structures of higher education to a considerable degree. So environmental education as a subject does not have the legitimacy that traditional subjects like physics, chemistry, and biology have. For example, a recent national panel to review science, math, and engineering education programmes across all federal agencies in Washington would not include environmental education recommendations in the committee report, partly because the subject does not have a serious enough status among scientists (Expert Panel, 1993).

In fact, the role of the university in defining what knowledge consists of in modern societies is so central that environmental education is seriously impeded until the universities regard environmental science as a serious topic. To some extent, this deficiency can be alleviated by inventive teachers at the lower levels who undertake inter-disciplinary projects but it is asking too much of teachers to invent the knowledge they are teaching while they are teaching it. The Norwegian national research projects were initiated partly to give teachers access to the expertise of the universities but it is not clear that such an interaction is the best solution to the problem. The Norwegian universities have tended to cast themselves in the role of experts with teachers as learners.

Also, the pedagogy of the university is extremely traditional in most countries, so that prospective teachers are unlikely to learn action-research or any other innovative methods of instruction, for example. In almost all countries the pre-service education of teachers is recognised as inadequate. Few teachers, or anyone else for that matter, think that teachers are well prepared for teaching environmental issues. This was a theme across all countries. In short, the traditional disciplinary structure and pedagogical practices of higher education serve as impediments to environmental education, and higher education institutions are located in a critical place to both produce and legitimise knowledge.

Relationship to economic development

Another major impediment to progress in environmental education is that it is often in competition with economic development. Business groups frequently oppose environmental actions and even contest the content of environmental education, especially in its activist and confrontational pedagogical forms. The recent GATT (General Agreement on Tariffs and Trade) agreement has little consideration of environmental issues. Although one can regard the Rio Conference as a triumph of environmental concerns, one might also regard it as keeping such concerns separate from the more important issues of international trade.

In all countries economic recessions have provided a major rationale for not doing more for the environment. In fact, the global economy has replaced the threat of communism as the major rationale for not protecting the environment. For example, the North American Free Trade Agreement (NAFTA) was opposed strongly by environmentalists in Canada, Mexico, and the United States because corporations have used Mexico as a dumping ground for dangerous environmental hazards. Many corporations have threatened to move their production facilities to South-east Asia if environmental restrictions similar to those in the United States and Canada are imposed on their Mexican operations.

So the free flow of capital across national borders throughout the world makes international environmental action mandatory if success is to be obtained. No doubt this international perspective should begin in the schools of all countries. While local issues are vital to the personal involvement and active engagement of students in action-research projects, and while national action is necessary as a practical political matter, international concerns are increasingly critical for future success of environmentalism world-wide.

Another promising area for development is vocational training. Vocational training relates directly to the workplace and economy. Not only are industrial production processes some of the primary polluting sources, the workers in them are the people most subjected to environmental hazards. Educating workers in environmental issues has an especially high pay-off. For example, pharmaceutical workers can learn not only the regulations that should govern the chain of production of drugs, but also the environmental consequences of such production, thus enabling them to serve as environmental advocates for themselves and society. Germany already has an extensive vocational training programme which incorporates 80 per cent of all students. Guidelines for vocational training programmes (more than 100) are set in Bonn for the entire country, although each of the sixteen *Länder* implement the training programme as they see fit. Environmental training is an important topic in these programmes with students learning about production processes, waste products, etc.

On the other hand, in Australia market ideas have come to dominate education generally, in the view of some. Most education is attuned to the "global economy" with resulting standardisation and privatisation. Environmental education has found a place at the primary level but is difficult to squeeze into the secondary curriculum (though contained in curriculum guides) and is mostly absent at the university level. Certainly the conflict between environmentalism and economic development is a deep-seated one in that the very life style of Western culture, now enthusiastically embraced in many other parts of the world, is centrally implicated.

In the words of the Hungarian report,

> "The basic conflict in environmental education is that it wishes to make children accept the attitudes that are in direct contrast to the models presented by the modern consumer society (...). It is significant that these means – think only of the goods offered in an infinite variety and the advertisements that publicise them – possess a substantially larger financial backing than the means of environmental education, which offers gentleness, moderation, and consideration, and that they thereby also possess an active force that shapes and influences consciousness (see Döry, 1993, p. 10*a*, in the Hungarian report)."

On the positive side, the World Bank has allocated about $2 billion dollars for environmental projects administered through its Global Environment Facility (GEF), or about 8.4 per cent of total World Bank lending in 1993, up from 3.0 per cent of total lending in 1990. This money is intended for projects with primarily environmental objectives in which at least half the costs or benefits are environmental. Although there have been disagreements between donor and recipient countries over project priorities, the establishment of an organisation with such a purpose is an important institutionalisation of environmental concerns at the world level, extending into developing countries (*The Economist*, 1993-94).

Environmental education as a social movement

Environmental education operates as a social movement in most countries. It is part of the general environmental movement but also something distinctly its own. As such, it manifests some features of social movements. It has charismatic leaders, intensely committed participants, competing factions, differing beliefs and ideologies, orthodoxies, and a highly decentralised social structure. Social movements lack close co-ordination of efforts because they consist of many independent groups (Morris and Mueller, 1992). They also exhibit a strong moralism which is manifested in personal commitment.

Since participants are so emotionally committed, they sometimes lack self-awareness about what they are doing. Systematic evaluation and reflection are not high priorities. At their most politically potent, groups are combined into networks so that activities can be co-ordinated within a loose, decentralised social structure. Development of these networks, which entails building intermediate organisations, offers one of the best chances of improving environmental education.

Furthermore, in the case of environmental education the networking development must be across countries because environmental problems are international in origin. In every country major environmental threats loom from outside. It is necessary to build local, regional, and national organisations to influence government actions and to co-ordinate activities internationally so that governments can be approached simultaneously in several countries. No government should have the excuse for inaction that the problem lies outside its borders.

The ENSI project offers a model for such international co-ordination and development, and the building of international networks is an appropriate task for international organisations like OECD. Of course, building such organisations requires support in the form of money and legitimacy. Securing government support for such a cause is always delicate since governments may withdraw their support when criticised or in disagreement. And there is always a chance that activist groups will be co-opted by working too closely with government ministries.

However, co-optation is a risk that activists must take since government co-operation is essential at some point. The tasks of non-governmental organisations include lobbying the government and educating and focusing public attention. Taking money from the government while simultaneously lobbying it requires considerable skills of diplomacy and negotiation. From the government perspective, the trade-off is that governments themselves need the legitimation provided by broad-based, grassroots movements that address issues the public regards as serious. Governments must show they are doing something about the environment; few governments can ignore such issues completely.

Keeping environmental education in the public eye so that it is a high priority issue is another important task. The public has limited space for dealing with social issues, and only a few problems ever become issues for public debate. Groups opposed to environmental action do not want the environment to become a high priority issue because then the government is expected to act. In general, politicians in power have established a balance of issues and interests that help keep them in power. New issues may disrupt the power balance, especially if the new issues are intrinsically controversial. Controversial issues threaten to divide internally the constituency that the government has used to gain and maintain itself in office (Carmines and Stimson, 1989).

Hence, there is an inertia to defining new policy issues on the part of established politicians. Also few citizens are active on any public issues at all. Most people are content to vote and attend to their private lives. Usually, new public issues are raised by activists who push new issues into public attention, where politicians may be forced to take political stances on them. Once prominent politicians do take stands on new issues in their struggle for power, the issues are thrust into prominence. Another way for issues to gain prominence is by externally disruptive events, such as the meltdown of nuclear power plants or other environmental disasters. (Politicians also become prominent by taking stands on popular issues, which accounts for the sometimes strange political alliances that form around environmental issues. Political parties who might be expected to embrace environmental issues may ignore them, while parties out of power may see them as ways of gaining public support, especially if their more central issues are unpopular.)

Activists (less than 5 per cent of the population) play a critical role of forcing issues into public awareness. However, being an activist is quite costly in time and effort, and even activists themselves are passive much of the time. Activists usually become engaged politically when they see an issue as being important enough to expend their time and effort and when they see themselves as being able to "make a difference". Alienated people are not activists and not even activists will pursue lost causes. People who hold strong opinions on important issues are the ones who mobilise public action, which then motivates politicians to undertake political endorsements and action eventually.

So government support of environmental education policies is obtained through activist organisations that mobilise the public. The organisations themselves provide support and encouragement to their members by encouraging their activism and reducing the high personal costs associated with such activity. Intense activism eventually leads to "burn-out" among those most committed, so that restoring the energy and motivation of members is a critical function of supporting network organisations. Building networks is critical to long-term success since they provide needed mutual support.

Strengths, weaknesses and possibilities

Finally, this section briefly outlines the strengths, weaknesses, and possibilities of environmental education policies. The weaknesses include the fact that environmental concerns are not institutionalised in most governments in strong fashion, except in a few countries perhaps. Environmental concerns are not regularly and powerfully represented when government policies are formulated. Such policy concerns come after the fact, if at all. Furthermore, there are powerful opposing interests which are institutionalised and organised both within and outside governments. Third, the environmental movement itself is decentralised and unorganised, consisting mostly of groups of local or regional activists and professionals.

However, environmental education also has substantial strengths. First, there is genuine public concern about the environment. Surveys in many countries indicate that this public concern runs deep and is not likely to be alleviated by government or corporate assurances that there is no need to worry. Second, there is already a dedicated core of activists, including many educators, in many parts of the world who are committed to action, even if they are loosely organised. They have ideas about what to do and given the opportunities and resources could generate many more. Third, the nature of the environmental threat is such that precipitating public events are likely to occur frequently, thus stimulating public action. In other words, there will be many opportunities to mobilise public opinion around environmental disasters.

Another asset of environmental education is that education is perceived as less threatening to those in power than are other more confrontational forms of environmentalism. Indeed, education is seen by everyone as a long-term solution which is acceptable because of its gradual, pacifist nature. In general, environmental education advocates both within and outside governments can afford to accept a gradual pace of change and take the long view. The work of environmental educators should not be measured in units of years or decades or even lifetimes, but of generations. No revolutionary event is likely, none is needed.

Another developmental strategy is for advocates to work out compromises with opposing interest groups where possible and seek actions where agreement can be obtained, such as in vocational education and job training. Where such agreement is not possible, then governments can delegate authority and responsibility to lower levels of government, so that action can occur where local or regional consensus exists, even if agreement does not exist at the national or international levels.

Also activists can focus public attention on critical environmental issues in the hope that the public will stimulate government to further action. In some cases activists can confront authorities aggressively since the media respond quickly to public conflicts, although confrontation politics is workable only where this form of protest is culturally accepted, which is not the case in all countries. And activists can rest, re-energize, and evaluate what they have accomplished almost everywhere. Pausing to reflect is important if the movement is to maintain some rationale guidance.

Finally, the Finnish study suggests primary things that should be done directly within education. First, figure out how to disseminate the insights and practical experiences of classroom teachers to other teachers, presumably this is best done by building networks of teachers and schools. Second, establish and support a research milieu which is relevant to environmental education and establish links between this research base and the schools. Although this has not been a high priority in any country, such knowledge and legitimation are necessary eventually if the movement is to secure long-term government support. Third, reinforce local, regional, national, and international collaboration and networking. In the very long run – which is the proper time scale to adopt – successful environmental education policy making requires building institutions.

Note on methodology

This paper is based primarily on in-depth case studies of five countries, plus national reports from the nineteen countries participating in ENSI. The five case studies were constructed by five different teams of three people (with some overlapping membership), who visited the five respective countries for one to two weeks and collected interview data. The national reports are self-reports from the co-ordinators of the ENSI projects. As might be expected, the national reports vary widely from each other in style and content, in spite of prior efforts to ensure some commonalty. Some reports focus on policy issues; some include no policy discussion. Some focus on project or classroom activities, while others focus on intermediate co-ordinating efforts. Some provide historical and contextual background while others provide none. In other words, the reports do not provide consistently similar information from country to country.

There are several ways of analysing such disparate "missing" data. What this paper does is construct a picture of the dynamics of environmental education policy formation and implementation by reading the in-depth studies first to see how the policy dynamics work in these five countries. Although the five in-depth studies also differ somewhat in emphasis and focus, they do cover common information essential to constructing an overall portrait of the general dynamics. After constructing a crude model of how things work, the national reports were then consulted to see how these might confirm or conflict with what was contained in the picture drawn from the in-depth studies. Several alterations and exceptions were made to the original analysis. The resultant analysis was then presented to the in-depth study authors and national co-ordinators at a conference in Braunschweig, Germany, on March 7, 1994. The analysis was accepted without much disagreement, although a few objections were raised to particular points, which are revised in this paper.

Other ways of analysing the data, such as building a taxonomy of environmental education policies in each country, were rejected as impractical and misleading since such a taxonomy would show huge blank areas, reflecting what was not covered in the national reports. For example, if a country spent its national report focusing almost entirely on classroom activities, which some do, a taxonomic analysis would show everything else missing. Of course, a conclusion saying there were no national environmental education policies would be misleading since every country has environmental education policies even if the policies were not discussed in the national report.

Also, it is not the wisest course to compare different countries to each other on some linear scale of environmental education development. First, countries would surely resent and reject such an implicit ranking, and, second, such a ranking would be incorrect. There is no singular unilinear scale of environmental education development. Countries make progress in different ways, not necessarily going through the same stages as another. Even though the countries show different levels of environmental education development, there is no single path nor single set of policies that will enable one country to tread the same path as another. Countries are too different for that. The general policy dynamics of environmental education presented here show what forces are present and influential in most countries, even though in any given country a particular social force may be weak or missing altogether.

Chapter V

Environmental Education: Dilemmas and Future Challenges

Environmental education: real or symbolic?

Environmental issues have always had a strong symbolic impact – and environment is often seen as part of what is good, virtuous and right. However, environment – like many "good" things – is also what is taken for granted and may not be noticed until it is gone or destroyed. Just as Marshall McLuhan, the media prophet, wrote in his reflections about the 21st century: man tends to see his world through a rear-view mirror when it is too late. Environmental issues go up and down on the political agendas of most governments and it is often easier to pay symbolic tribute than to actually take real and lasting measures that bring about change.

Education is certainly not spared this dilemma, and one of the major challenges of today is to go beyond the symbolic "earth day" or "field trip" in order to bring about change in the behaviour and understanding of students that will transform their relationship to the environment. In this sense, some would argue that environmental education is not just another subject on the curriculum but that environmental education should contribute to transforming students' understanding and behaviour in some way.

The foregoing chapters of this report illustrate that the Environment and School Initiatives Study (ENSI) has tried to analyse and understand this challenge at different levels:

i) The main objectives of the study were concerned with the *grassroots* school initiatives wherein students and teachers were invited to work on and attempt to change local environmental problems.

ii) On the *epistemological* level the study tried to tackle questions of interdisciplinarity and complexity, not because of the need for contribution from different disciplines but because real problems are rarely simplified fitting neatly into one discipline (Losito and Mayer, 1993).

iii) On the *pedagogical* level the study focused on an example of solving real problems in the environment, to tackle controversial situations, and confront the question of values and vested interests involving students, teachers and the community.

iv) Developing *dynamic qualities* in students through school initiatives was also analysed and seen as an indicator of the "realness" of environmental education and the extent to which students have integrated both knowledge and understanding of environmental problems. Students' ownership of projects and their own construction of knowledge was seen as an essential element in developing dynamic qualities. The "ownership of knowledge" also implies the capacity to think and reflect and to take initiatives as well as to discern the relevant dimensions of a situation.

Challenges for environmental education policies

The experience of the ENSI study over the last eight years has laid some of the groundwork for testing conditions, contexts and structures concerning environmental education. If the findings are to be used to inform policy-makers, the following major challenges would need serious consideration by the policy community.

Professional development of teachers

The fact that environmental education is still marginal, sporadic and uneven in OECD Member countries today is largely due to the lack of sound teacher training in this area. The ENSI study has shown that by building intermediate organisations such as school and teacher networks, initiatives can be launched and collectively supported even where policies are weak or do not exist. The risk is that when the network breaks down, or key partners leave, environmental initiatives may disappear.

ENSI findings show that dissemination of information, light house strategies, and exceptional examples are not sufficient. Teachers need concrete assistance to develop the necessary skills and face-to-face involvement in the classroom. The lack of articulated support can isolate environmental education from the evolution of the school itself, and even bring the innovative teacher into conflict with the rest of his/her colleagues.

Action-research has been found to be a useful tool in teacher development, especially in the way that it trains teachers to become reflective about the effectiveness of their own pedagogical strategies and gives them the confidence and skill to make changes in their practice.

Teachers need also to be given an active role in the development of environmental education curriculum: as shown in Chapter III, environmental education becomes "real" when teachers are involved in the construction of curriculum theory and in the creation of pedagogical knowledge through action-research. This process also has repercussions for staff development and teacher training.

Environmental education within the core curriculum

There are strong arguments for not keeping environmental education outside the general curriculum as an exceptional innovation given that governments have accepted sustainable development as a key issue for the remainder of this century and the next.

In this respect, the role of evaluation and assessment of education systems is increasingly important and environmental education needs to be part of this process, since as long as teaching is driven by examinations, environmental education should also benefit from this legitimation. The development of quality indicators to assess dynamic qualities as educational outcomes (outlined in Chapter II) is also important to consider as part of assessment methodology and in models of curriculum planning.

Interdisciplinarity, it could be argued, should also become an important part of curriculum reform and its role, location and function in the curriculum need to be reconceptualised in light of accommodating issues such as complexity, the role of values in new subject areas as health, development and environmental education.

Finally, along with the question of global markets and a world economy, the environment is the next important issue for world co-operation. The motto "think globally and act locally" is very familiar to school children and adults everywhere. A significant part of environmental education, within the experiences of ENSI as well as other initiatives, is getting students to share their data and results with schools around the world. The rapid advances in for example computer technology, interactive media, and electronic network are making it possible to run projects world-wide. Just like advanced scientists, students now can share findings, solve problems and construct new knowledge in collaboration with peers and elders in all parts of the globe.

The recent initiative by the Vice-President of the United States, Al Gore, to ask students around the world to monitor their environment and share the data world-wide with scientists is one illustration of the reality of internationalising curricula. Policy-makers therefore have significant responsibility to ensure that such international initiatives are part of a coherent educational policy concerning environmental issues in the internationalisation of environmental education and the international creation of curricula.

Partnership between the community and the school: the example of environmental education

Real environmental education cannot be limited to textbooks. The ENSI experience shows that students can work with surprising success within the local community, using it both as a source of local knowledge of their environment as well as a field for developing their skills in problem-solving, entrepreneurship and adult education (informing adults about local environmental issues). Working in the local community also prepares students for responsible adult roles and can be a kind of prevocational training. Many of the ENSI initiatives were carried out in partnership with among others local industries, municipal authorities, and farms thereby introducing students to the "real" world.

Working in the local community forces environmental education to integrate economic and social elements within its bounds, as well as confronting controversial, real issues.

A challenge for quality and relevance in education

The results of the study show that good environmental education can act as an exemple for the quality of education in general. Notably its success in motivating students, both through active pedagogical methods and subject matter that is relevant to their present and future lives including the acquisition of skills and attitudes that can be directly applied in work situations. Some of the case studies showed that students who do not profit from traditional academic teaching can find new interest in school work through their involvement in environmental initiatives. Girls are also found to improve their performance in science subjects through environmental education.

Environmental education requires high level of competences of both teachers and administrators because of the necessity of using more flexible approaches, developing groupwork and interdisciplinarity and mastering information and the technologies for its retrieval. New skills and creative potential are required of teachers, as well as the ability to evaluate their own work and make changes when needed. This also implies in-service training and life-long learning strategies, since one time solutions are no longer possible.

The challenge for higher education

Universities have a key role in the production and legitimisation of knowledge that is then translated into the curriculum in schools. Environment does not fit neatly into one disciplinary structure and therefore is often left out of higher education syllabuses, especially those dealing with teacher training. The consequences of this policy are particularly difficult for secondary school teachers who are obliged to stay closer to the traditional disciplines in their teaching.

The United Nations Conference at Rio in 1992 (Agenda 21, Chapter 36 "Promoting Education, Public Awareness and Training") has given the impetus of sustainable development to environmental education, widening the boundaries of environmental education to include the physical and the social environment and thus challenging traditional teaching methods. The training of teachers and teacher trainers is an important repercussion of this change as is the necessity of the concept of life-long learning. It is important that higher education institutions consider the development of a systematic policy for life-long environmental education that includes pre-service and in-service training.

The organisation of environmental knowledge at the higher education level has a significant influence on environmental education both for training and for the legitimation, status and function of environmental education in the school curriculum. Hence developing environmental education from the periphery to the centre of education policy and practice will require the involvement of institutions of higher education.

The challenge for vocational education

The test of good environmental education, and dynamic qualities in students, is the world of work. Graduates from the school system will need to know how to apply their environmental knowledge, awareness and skills in their professional milieu. Industry and the state will increasingly require environmentally knowledgeable workers. Vocational education therefore must be able to make this important link between environmental education in school and the environmental knowledge and skills required in the world of work by developing environmental competencies related to specific occupations.

Vocational education teachers need to be equipped with special vocational/environmental teaching skills and with insight into industry's needs and responsibilities. It is also recommended that vocational educators be aware of progress in the creation of employment through clean technologies and new environmental professions, a field that is now rapidly emerging.

Concluding remarks

In this concluding chapter, attention has been drawn to key issues and challenges facing environmental education, as revealed by the work of the Environment and School Initiatives Study (ENSI). These can be seen as falling within three main challenges for the future of environmental education:

a) The challenge for educators, policy-makers and practitioners to move environmental education from a peripheral phenomenon to a mainstream activity in education.

b) The challenge to provide teachers both in pre-service and in-service training with the necessary skills and competences to teach and develop environmental education at the school level.

c) The challenge of finding a place in the core curriculum for environmental education. If governments at the highest level seriously consider sustainable development as the key issue for the 21st century then education policy-making should reflect this in determining what core curriculum is about and the place for environment therein.

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